

# THE IRON AGE

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## Plant Operates Mutual Aid Society

Allis-Chalmers Has Long Record of Success in Providing  
Employees with Medical Attention and Disability  
Compensation at Low Cost

FOR 47 years a successful mutual aid society has been operated at the West Allis, Wis., plant of the Allis-Chalmers Mfg. Co. Membership in this is not compulsory but records show that less than half of 1 per cent of the employees have not availed themselves of the services offered. Annual dues are low, in view of the character and scope of medical and dental work and consultations which are open to members. There also are advantages resulting from low and standard charges for drugs and hospital services.

Membership dues are now \$6 a year, and for this sum an employee is entitled to \$1 a day for 90 days for total disability resulting from sickness or from accident; hospital and medical attention, also services of a specialist if advisable; necessary prescriptions; X-rays, and a death benefit of \$100. On the basis of 50c. a month per member, plus an equal sum contributed by the company, this mutual aid society always has been self-sustaining without resorting to assessments, even in the years when "flu" epidemics greatly raised illness and death rates.

When a man is employed no effort is made to sell him a membership beyond an explanation of the functions of the aid society. The organization consists of a president, vice - president, treasurer, secretary, the three members of a board of appeals, also committeemen. The treasurer and the secretary are each required to post a \$1,000 bond, the premium being paid by the society. The constitution states specifically that in all cases where the provisions of the by-laws cause hardship or injustice, in the opinion of the executive committee, either to members

or physicians, the executive committee is empowered to take action to alleviate the condition. All decisions of the board of appeals are binding upon all parties.

### Membership Cancelled for Arrearage in Dues

Any member leaving the employ of the company on account of disability, and not entering the employ of any other concern, or not going into business for himself or herself, may continue to be a member of the aid society, provided all dues are paid regularly. But, if any member shall become in arrears for dues, his or her membership shall cease as of the last day of the month for which dues have been paid. Membership dues must be received by the officers of the society not later than the last day of each month.

Any member who practices or attempts to practice fraud or deception in any form to secure or attempt to secure any aid or benefits from the society is subject to suspension for such period as the executive committee shall determine, but no suspension is ordered without first affording the accused and his witnesses an opportunity to be heard.

The plant is divided into 26 units, each of which elects a committeeman. These committeemen and the officers of the society meet once a month as an executive committee. The president, vice - president, treasurer and the three members of the board of appeals are elected annually by popular vote of the members. The secretary is elected by the executive committee. An employee must have been a member of the society for at least six months

ALLIS-CHALMERS MANUFACTURING CO.		AID SOCIETY FORM
MUTUAL AID SOCIETY APPLICATION		
AGE _____		
NAME _____	CLOCK NO. _____	
OCCUPATION _____	DEPT. _____	
PREVIOUSLY EMPLOYED { YES <input type="checkbox"/> NO <input type="checkbox"/> }	MARRIED { YES <input type="checkbox"/> NO <input type="checkbox"/> }	WIDOW <input type="checkbox"/>
	WIDOWER <input type="checkbox"/>	NO. IN FAMILY _____
AID SOCIETY { YES <input type="checkbox"/> NO <input type="checkbox"/> }		
THE UNDERSIGNED HEREBY MAKES APPLICATION FOR MEMBERSHIP IN THE ALLIS-CHALMERS MUTUAL AID SOCIETY. WHEN GRANTED SUCH MEMBERSHIP HE DIRECTS THE ALLIS-CHALMERS MANUFACTURING COMPANY TO DEDUCT THE SUM OF 50 CENTS PER MONTH FROM HIS WAGES AND TO PAY THE SAME TO THE SAID SOCIETY TO COVER HIS DUES.		
SIGNATURE _____	ADDRESS _____	
WITNESS _____		

An Employee Who Signs This Membership Application Blank Does So Voluntarily

before being eligible to hold office and no committeeman is eligible for reelection unless he has attended two-thirds of the meetings during the previous year. A committeeman is elected by ballot of the members from each unit or district in the plant. The president for the current year has served the company since 1895, first as a journeyman machinist and later as a shop executive. The secretary has been with Allis-Chalmers Manufacturing Co. since 1902. The secretary is the only officer who receives compensation from the society and none of the officers devotes full time to society work.

#### Physicians Chosen Jointly by the Society and the Company

The executive committee, working with a committee appointed by the Allis-Chalmers Mfg. Co., chooses the physician, who has full control of the medical work of the society, subject to supervision by the executive committee and the industrial relations committee of the company. The physician holds office at the will of the executive committee and he may be removed from office after 30 days' written notice. He is responsible for full medical and surgical attention to all members. He must retain an assistant, who must be qualified to render the same medical service as the physician, who must pay the salary of the assistant. Also, an associate physician is selected in the same manner as the physician, and he, too, must have a qualified assistant whose salary is paid by the associate physician.

An eye, ear, nose and throat specialist is similarly selected. His duty is to render general service, but he is not required to perform surgical operations for the relief of eye, ear, nose and throat ailments. The society pays the physician and the associate physician a given sum per member per year. One surgeon has served the aid society in this way, for 20 years.

Cost of dental work is not borne by the aid society. Arrangements are made with several reliable dentists, each to spend 1½ hr. a day at the plant, where first aid is administered and advice given. Dentists do not receive pay from the aid society, but receive their compensation from the practice which they derive from the members and their families. The society provides dental X-rays and pays a sick benefit if dental condition is a factor in illness. Formerly dental X-rays were made outside of the plant, but recently the mutual aid society purchased an X-ray machine is now operated by the company and the society machine is now operated by the company and the society no longer bears its expense.

#### What A Member Is Entitled To

Now then, what is a member entitled to for his 50c. a month? For total disability resulting from sickness he receives \$1 a day for 90 days for any one illness. He

does not, however, receive pecuniary benefits for the first week of disability due to illness.

The member is entitled to \$1 a day for 90 days if the disability is the result of a non-industrial accident. He will receive not exceeding \$7 for disability due to any one industrial accident. If the case is one of accident compensation under the State laws, the member does not receive pecuniary benefits from the society during such time as compensation is provided by law. But for such periods as the law does not provide compensation the society pays \$1 a day up to the limit of 90 days. Under the present State laws, compensation for accident is for one week following the first two weeks of disability. However, the mutual aid society pays \$1 a day up to the time when compensation is provided by law, when it ceases payment,

again resuming the \$1 a day when the duration of compensation under the law has expired. Compensation is paid once a month following the monthly meeting of the executive committee, which must approve all benefit checks.

Accidents to members when outside of the company plant are considered cases for the society and all benefits specified in the by-laws are extended to the injured member.

All hospital expense resulting from recommendations by the society's physician are borne by the society for a period not exceeding eight consecutive weeks in any single case. The society has a ward bed rate understanding with a leading hospital; however, if a physician recommends a private room and day and night nurse, the expense is paid by the society. If a member decides to go to a hospital other than the one with which the society has made arrangements, the society will compensate up to the price paid for a ward bed in the hospital with which the society has an agreement. If a member so

wishes, he may secure a private room by paying to the hospital the difference between the ward bed rate and the charge for the private room. All medicine and incidental charges made by the hospital under the orders of the physician are paid by the society.

In cases which are certified by a physician of the society to require the services of a specialist, the society will furnish the first examination and first treatment by a specialist selected by the society physician, provided that the work of the specialist is performed under the supervision of the society's physician. The society does not in any event furnish the services of a specialist for operations.

All authorized prescriptions for use of members issued by a society physician for filling by an authorized druggist of the society are paid for by the society. Prescriptions issued by other than the society's physicians are paid for by the society only if they are approved by the aid society

#### Comparative Revenue Statement of Some of the Principal Income and Expenditure Items

	Year	
	1928 Average per Member per Year	1927 Average per Member per Year
Income		
Members' dues .....	\$5.739	\$5.400
Company's contribution .....	5.739	5.400
Interest from investments .....	0.061	0.053
Interest from bank account .....	0.068	0.065
Benefit checks unclaimed, cancelled .....	0.028	0.044
Benefits and expenses		
Sick benefits .....	3.753	3.729
Death benefits .....	0.618	0.750
Physician's salary .....	2.436	2.250
Other physicians .....	0.014	0.091
Eye, ear, nose and throat specialist's salary .....	0.750	0.750
Other specialists .....	0.059	0.048
X-ray examinations .....	0.304	0.311
Prescriptions .....	0.067	0.775
Outside hospital expenses .....	0.197	0.181
Automobile services .....	0.008	0.006
Outside nurse .....	0.013	0.009
Secretary's salary .....	0.009	0.009

physician and filled by an authorized druggist of the society. Prescriptions for treatment of traveling members are paid by the society only upon certificate signed by the attending physician.

All X-ray examinations for injuries or sickness not caused by or resulting from accidents within scope of any compensation law to which the company is subject at the time of the accident are paid for by the aid society. Arrangements have been made with certain drug stores for standard price prescriptions. The cost is held down by the use of small bottles, which may be refilled if necessary. Ambulance service is provided by a contract made by the society, the expense being paid by the society. Either an ambulance or a cab is provided, depending on the character of the case.

#### Traveling Engineers May Become Members

Members, such as erecting engineers, who are sent on the road by the company, also derive certain benefits, such as \$1 a day during disability and \$2 a visit by a physician. The society pays benefits on any one such case up to a total of \$90.

The society has entered into a contract with an undertaker, who arranges a funeral for \$100. The death benefit paid by the society is \$100, this figure having been set to cover the cost of a contract funeral.

In a plan of this kind there must be of necessity certain limitations of benefits. Benefits are not paid for disability or death for which compensation is provided under workmen's compensation laws of any State. No pecuniary or hospital benefits or medical service will be paid or rendered to a member for disability which is caused, directly or in-

directly, by immoral conduct, intoxication, use of narcotics, performance of obstetrics, or fighting.

Benefits will not be paid for disability or death by reason of injury or illness caused by acute, subacute, chronic or essentially recurrent disease contracted prior to the date on which the member joined the society, though a member is entitled during such disability to regular medical and surgical service after he has been in the employ of the company continuously for 90 days. A member may receive only once during his membership benefits for disabilities resulting from a chronic or recurring ailment.

The work of the mutual aid society is entirely outside the scope of the welfare and medical and hospital service rendered by official act of the Allis-Chalmers Mfg. Co., either in its own efforts to promote the welfare of its employees or to carry its obligation in so far as the State laws are concerned. It must not be construed that because of the existence of this society the company has in any measure neglected to promote safety, provide first aid or to extend welfare activities to the employees and their families. These are highly developed activities carried on by the company. Any service rendered by the company is open on equal terms to all, regardless of whether membership is held in the society.

The mutual aid society's service is in addition to all this and is intended to relieve mental and financial worries and to render first-class service at moderate cost at times when its members are most in need. In this respect it must not be overlooked that the structure of the society is flexible, and welfare extended by it may, and often does, go beyond the strict interpretation of its by-laws.

## How Alumina Affects Slags in Steel-Melting Furnaces

IN view of the efforts made from time to time to introduce the use of alumina as a material for furnace construction, it is important to investigate the influence of slags which contain, contrary to the usual basic slags, a fairly high percentage of alumina, says G. Mars in an article in *Archiv für das Eisenhüttenwesen*, August, 1929, pages 103-115. Accordingly, trials have been made to ascertain how far it is practicable (1) to dephosphorize steel; (2) to desulphurize steel; and (3) to deoxidize steel with a highly aluminous slag. The experiments were performed in a 3-ton and a 6-ton electric arc furnace, and in a 30-ton open-hearth furnace. The results are summarized as follows:

The dephosphorization of steel in the electric furnace with aluminous slags is more difficult to carry out than it is with pure lime slags, while in the open-hearth furnace it is practically impossible to dephosphorize with aluminous slags. In the electric furnace, in order to secure a good phosphorus distribution coefficient, the aluminous slags must contain a certain minimum percentage (about 25 per cent) of metallic oxides. The dephosphorization of ferrophosphorus with pure alumina is quite impracticable, since aluminum phosphate is reduced by contact with metallic iron, with formation of iron phosphide.

The desulphurization of steel with aluminous slags is impracticable, but in the electric furnace iron-carbon alloys and sulphide of iron can be desulphurized with lime-alumina mixtures and also with pure alumina. The lime-alumina slag takes up sulphur to the amount of 7 per cent corresponding to 15 per cent of sulphide of calcium, and the pure alumina takes up to 6 per cent of sulphur corresponding to 10 per cent of aluminum sulphide.

As a deoxidizer, aluminum behaves exactly in the same

way as silicon, but it has the great advantage that its oxide is not so strong an acid as silica, and it can therefore be used in a more highly concentrated form than silicon, even in the basic electric furnace, without adversely affecting the desulphurization and without attacking the furnace lining.

#### New Method of Making Steel from Indian Pig Iron

INDIAN pig iron is generally unsuited for steel manufacture, the phosphorus content being too high for acid practice and too low for standard basic practice. N. Mathur, in an article in the *Journal of the Indian Chemical Society* (Vol. 6, No. 3, pages 353-355), proposes a new method of making steel from Indian pig iron.

Molten pig iron is poured into a basic lined converter to which a certain amount of burnt lime and mill scale have been previously added to neutralize the extra amount of silica, formed from the oxidation of the silicon in the charge, and at the same time to produce a highly oxidizing basic slag. The metal is blown according to standard acid practice, no afterblow being necessary for the oxidation and removal of the phosphorus. The silicon and manganese in the charge produce a temperature high enough for casting purposes. At the end of the blow, ferromanganese and ferrosilicon are added to bring the metal up to the required analysis.

At the Mysore Iron & Steel Works steel is being successfully produced in a basic lined converter using direct iron with 0.12 per cent of phosphorus or cupola metal with 0.14 to 0.15 per cent of phosphorus, the phosphorus being reduced in the final metal to about 0.026 per cent.

# Strip Mill Provides Flexibility

Third Unit Completes Coverage in Widths and Gages  
for Acme Steel Co.—Straight-Line Flow—  
Efficient Electric Control

BY ROGERS A. FISKE\*

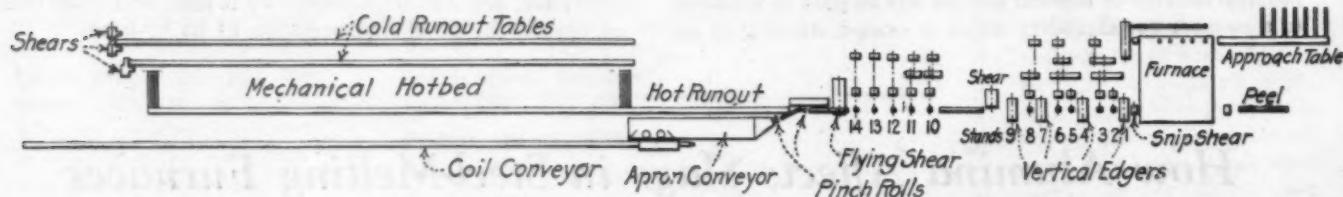
**F**OREMOST among the features of the new No. 3 hot-strip mill at the Riverdale, Ill., plant of the Acme Steel Co. is the use of two-high stands equipped with rolls that are true cylinders. Instead of the rolls having necks, the roller bearings back up the rolls on the extensions of the rolling surface. This construction assures ample bearing area and general ruggedness of construction. Also, the vertical edgers are of unusually heavy design so that, when rolling narrow widths, they may be used for reduction of area by the insertion of vertical rolls with oval and square passes.

This unit is one of three hot-strip mills at the Riverdale plant. It was installed to add flexibility to operations and to give this company complete coverage of the hot-

from the side. The steel, as it travels sidewise down the furnace skid pipes, moves at right angles to the roll passes. The peel trough and the billet ejector (the latter consisting of a square steel rod operated between two motor-driven rolls) are mounted on the main floor.

The furnace is fired by producer gas through eight burner sets which are supplied with preheated air from a cast iron recuperator located in the downtime. Waste gases from the furnace pass through a flue, beneath the floor, to a 90-ft. steel stack, which stands on a foundation outside the building. The damper projects through the floor.

This furnace has an outside width of 33 ft. 6 in. and it will take a billet 32 ft. long. The design is such that the



Steel Passes in a Direct Line from Raw Steel Storage to Approach Table, Upper Right of Diagram, Thence Through the Mill to the Finished Product Warehouse

strip market. No. 1 mill can roll strips 1 in. to 3 in. wide, but cannot roll strips heavier than  $\frac{1}{8}$  in. No. 2 unit will roll all ordinary thicknesses in widths from 3 in. to 20 in. The new No. 3 mill will roll strip from  $\frac{3}{8}$  in. to 6 in. wide. Thicknesses as light as 0.025 in. may be rolled in the narrow widths and as light as 0.035 in. in the wider. Further, any desired thickness may be rolled in the heavy range of gages in all widths.

This mill is housed in a main structure 800 ft. long by 90 ft. wide. At the south end is a 100 x 300-ft. extension to the west, which is used as a finished product warehouse. The warehouse is served by a 10-ton overhead crane, a depressed railroad track and floor space for loading truck shipments. The bulk of the product is stored on corrugated steel skids, which may be moved either by the crane or by electric lift trucks.

Semi-finished steel, in bundles of 15 tons each, is received and stored in the north end of the main mill building. Billets are of a number of sizes, ranging from  $1\frac{1}{4}$  in. square to  $2 \times 5\frac{1}{4}$  in., and all are 30 ft. long. These 15-ton bundles are unloaded from railroad cars to storage by a 15-ton overhead traveling crane, which takes the bundles from the storage dock to the charging dock. The latter is equipped with a furnace approach table. The same crane runway extends also over the roughing and finishing stands.

Rated at 40 tons an hour, the billet heating furnace, which was designed by Oliver P. Leutscher, Peru, Ill., has a conventional pusher and is charged, and also discharged,

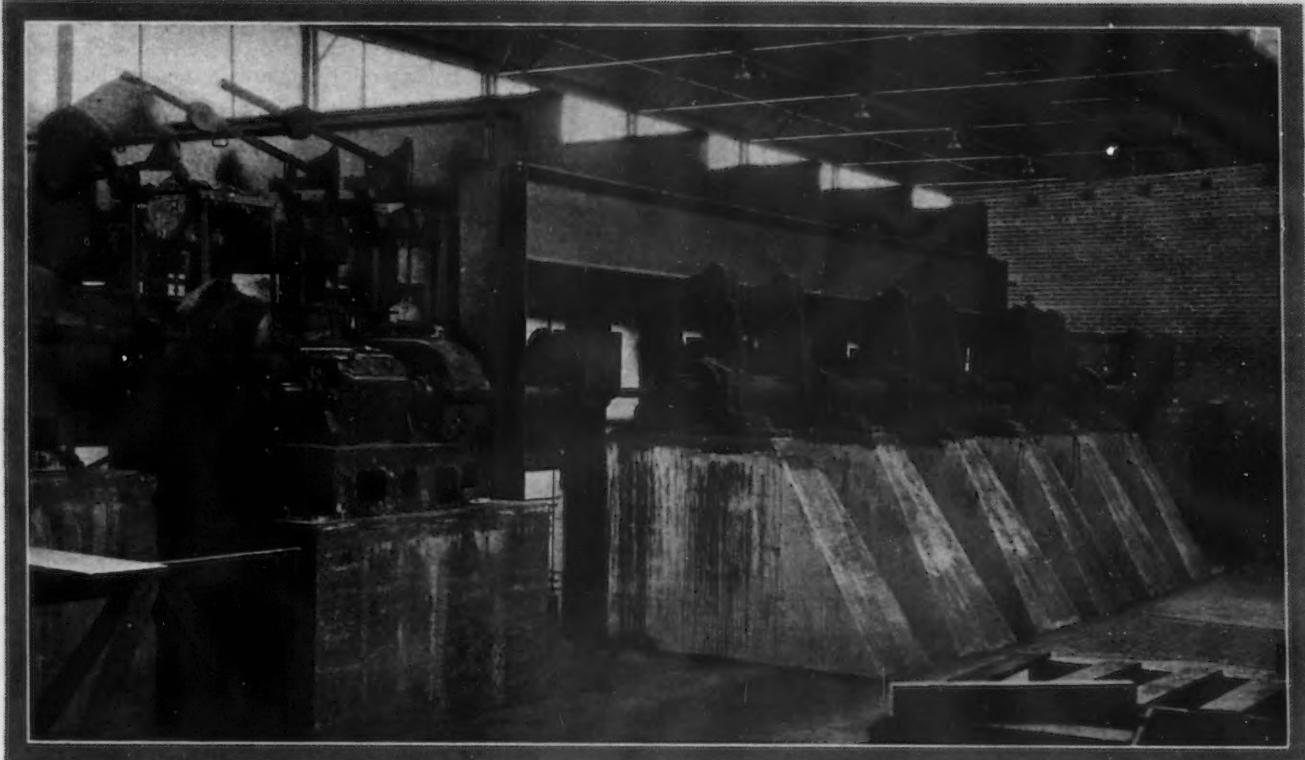
width of the furnace may be increased in the event that it is desired to use 40-ft. billets. Fuel consumption on a monthly basis is about 120 lb. of coal to each ton of billets heated to rolling temperature. The furnace roof, of the flat suspended-arch type, is carried on a girder system entirely independent of the furnace and resting on columns which are clear of the furnace and its accessories.

Heated steel moves in a straight line from the discharge door of the furnace to the vibrator. In front of the furnace door is a snip shear of the toggle type. Then follows the roughing mill, which consists of a vertical edger, two 12 in. x 15-in. horizontal roll stands, a vertical edger, two 12 in. x 15-in. horizontal roll stands, a vertical edger, a 12 in. x 15-in. horizontal roll stand and finally a fourth vertical edger. Each edger is driven by a separate variable-speed, direct-current motor. The first four horizontal roll stands are in pairs, each pair being driven through a reduction-gear set by a variable-speed, direct-current motor. The last roughing horizontal stand has a separate motor.

Between the roughing and finishing mills is an electrically driven flying cropping shear which is controlled by an operator at the shear. Crop ends fall to the basement, where they are easily removed in wheelbarrows.

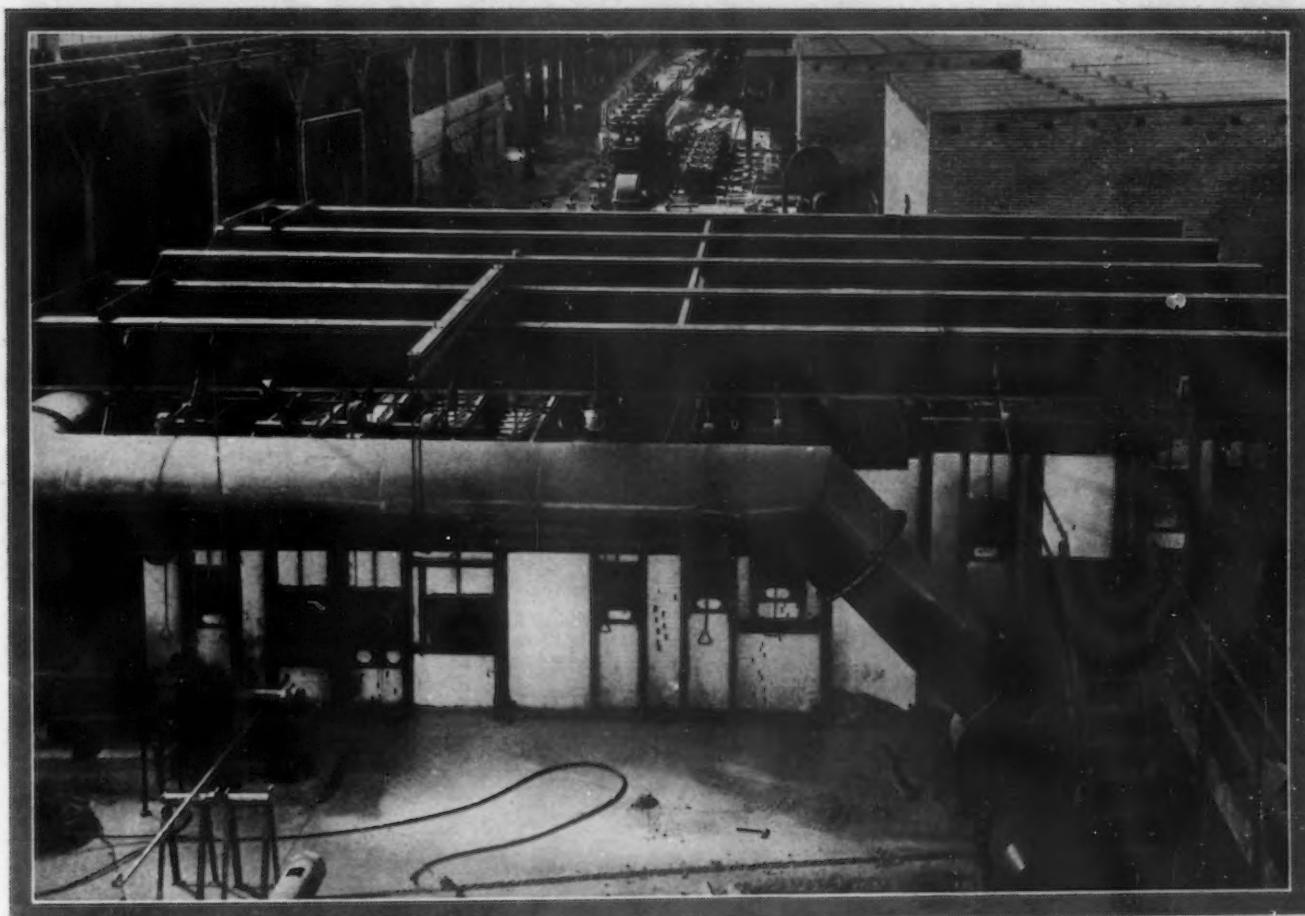
The finishing section of the mill consists of five two-high stands, each driven by a separate variable-speed, direct-current motor. The first two motors at the incoming end of this unit are connected with the stands through reduction-gear sets. The remaining three are direct-connected. The main pulpit, in which are located the controls for the roughing and finishing mills, is conveniently lo-

\*Western Editor, THE IRON AGE, Chicago.



STEEL Is Charged into the Side of the Furnace and Is Worked Forward by a Battery of Pushers (Above).  
The recuperator is located in the back end of the furnace setting, beneath the pusher rods

FURNACE Roof Suspension Members (Below) Are Unusually Heavy. The blower in the lower right-hand corner draws hot air for combustion from a cast iron recuperator



cated to the side of and above the level of the finishing stands.

#### Coils and Straight Lengths Made at Will

This mill is designed to coil hot strip in such thicknesses as it can be coiled. Also, there is a 230-ft. hotbed for straight and cut strips. On this score special equipment has been provided, the different units to be operated depending on whether straight or coiled strips are to be produced. A rotary flying shear has been placed after the last finishing stand. This shear has only one blade and makes one revolution at each cut. It is used to cut to cooling-bed length strips which are to be run out on the cooling table.

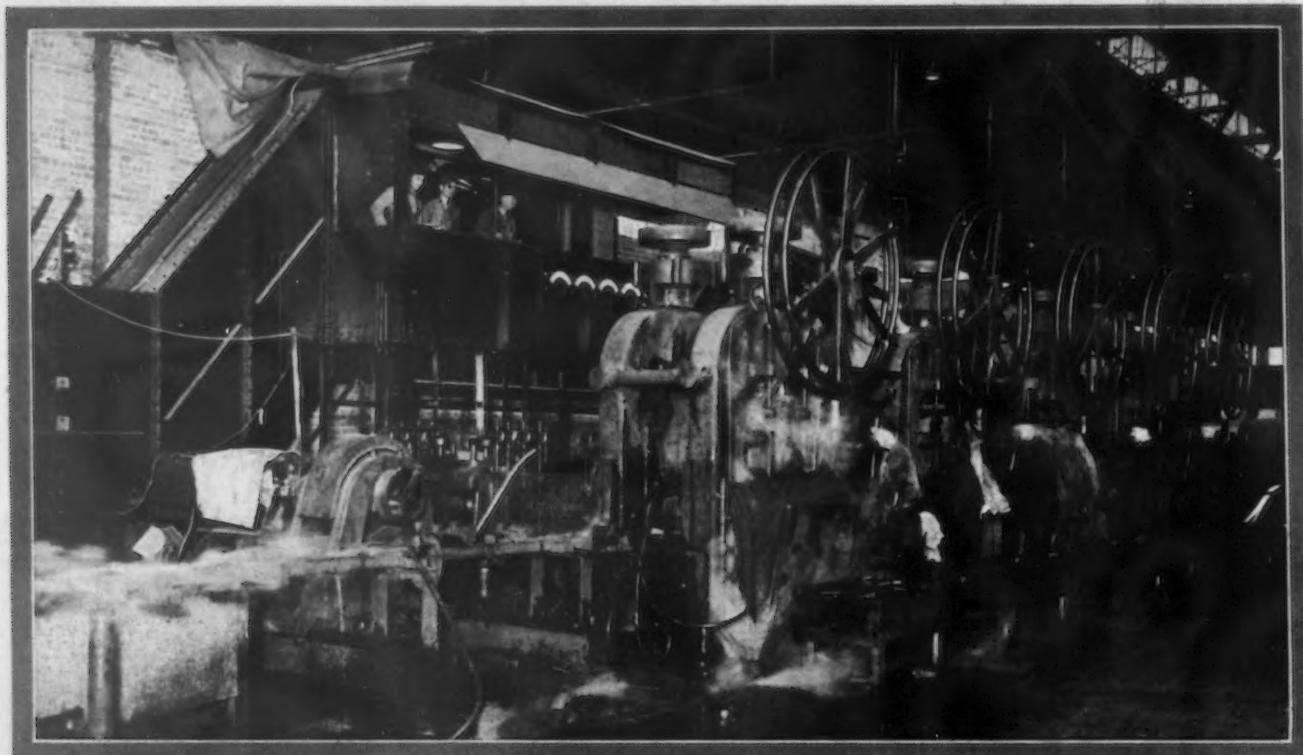
Between this shear and the hot-run table is a gap in which is placed either a section of hot-run table, for straight strips, or pinch rolls and guides and a vibrator, if the strips are to be coiled. There are 15 rolls, driven by individual motors, in the removable run-out table. This

ment for the hotbed is a 230-ft. transfer crane, which travels across the building over the hotbed and cold-run tables. This is electrically operated and it handles its loads by means of a series of magnets spaced on 18-in. centers. By means of this transfer crane strips may be lifted from the shuffle bars and dropped on any one of the four cold-run tables, or strips may be transferred to any part of the table which is empty.

All of the mechanical equipment for this hot-strip mill was furnished by the United Engineering & Foundry Co., Pittsburgh. Overhead electric cranes, both in the main mill structure and in the finished product warehouse, were designed and built by the Whiting Corporation, Harvey, Ill.

#### Twelve Motors Drive Fourteen Stands

Complete electrical equipment for the main rolls and mill auxiliaries was furnished by the Westinghouse Electric & Mfg. Co., East Pittsburgh. In laying out this mill, it was desired to be able to produce a wide range of strip,



**FINISHING** Section of This Mill Consists of Five Two-High Stands, Each Driven by a Separate Variable-Speed Motor. Rotary flying shear appears in left foreground

removable equipment can be changed in 5 min. by means of the overhead crane.

With the vibrator in place the strip passes to the take-up section of an apron conveyor and then to the apron conveyor proper. Two reels have been installed, with kick-off mechanism and a device which loads coils on the charging end of a coil conveyor, which extends along the east wall of the building to the finished storeroom section of the structure. This apron conveyor, the kick-off and the coil conveyor are operated from a control stand located near the reels.

As previously outlined, if straight strips are wanted, the section of run-out table is put in place of the vibrator and auxiliary mechanism. The strip is then cut by the rotary flying shear and passes down the hot run-out table, which extends the full 230-ft. length of the hotbed. On the opposite side of the mechanical hotbed are four parallel cold-run tables which are the same length as the hotbed and which terminate at four shears.

Of special interest in connection with auxiliary equip-

hoop and small flat sizes, and also to be able to change quickly the mill set-up from one schedule to the next, so as to operate the mill economically on orders of relatively small tonnages. The required flexibility was attained by the installation of 12 direct-current adjustable-speed motors to drive the ten horizontal and four vertical roll stands, thus giving individual control of the speed of all except the first two pairs of roughing stands. The motor characteristics are as follows:

Stand No.	Motor H.p.	Motor R.p.m.
1 (Edger) . . . . .	150	400/1200
2 . . . . .	600	400/1000
3 . . . . .	150	400/1200
4 (Edger) . . . . .	600	450/900
5 . . . . .	150	400/1200
6 . . . . .	600	450/900
7 (Edger) . . . . .	150	400/1200
8 . . . . .	600	450/900
9 (Edger) . . . . .	150	400/1200
10 . . . . .	600	450/900
11 . . . . .	600	450/900
12 . . . . .	700	264/595
13 . . . . .	800	382/908
14 . . . . .	800	382/908



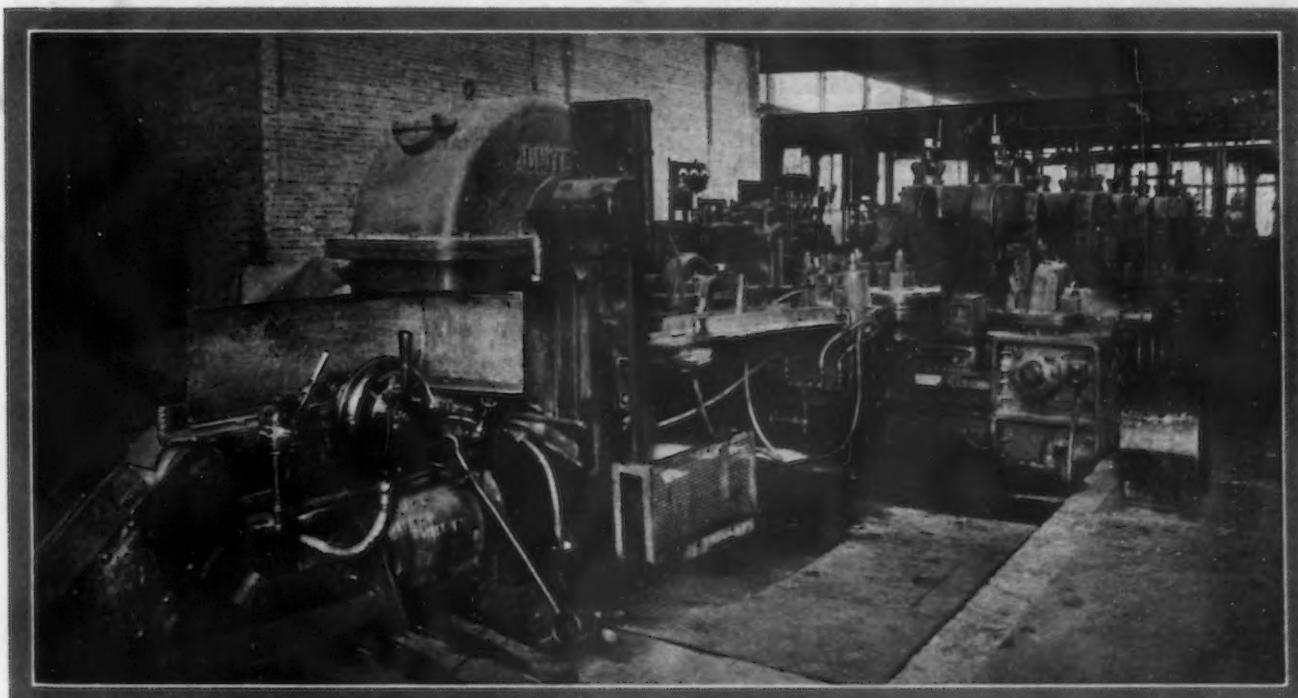
**H**OTBED Transfer Crane Is 230 Ft. Long. It travels across the building and serves the hotbed and run-out tables, lifting the steel by means of numerous magnets

The four 150-hp., vertical-roll edging stand motors are located in the mill, and are flexibly coupled to the reduction-gear sets. The three 600-hp. motors driving the five horizontal roughing stands are located in a separate motor room, apart from the main substation. The five finishing stand motors are located in the main motor room substation, together with the large motor-generator set and switchboard and control equipment. All of the roll motors are provided with rear inclosing end bells and are artificially ventilated with filtered air.

Power for operation of the twelve 600-volt roll motors, and for auxiliaries and excitation, is provided by a single large five-unit synchronous motor-generator set. This set consists of two 2000-kw., 600-volt generators for main motor power, a 300-kw., 250-volt generator for auxiliary

and crane motor power, and a 100-kw., 250-volt exciter generator; all driven by a 6350-hp., 80 per cent power factor, 3-phase, 60-cycle, 12,000-volt synchronous motor. Combination of all generating equipment into one large machine permitted a compact arrangement of the substation and also resulted in somewhat more efficient operation than with two or more smaller units. Also, the selection of the 12,000-volt synchronous driving motor, made feasible only by the installation of one large set, permits connection directly with the supply lines of the Commonwealth Edison Co., thus simplifying the switching equipment layout and improving the efficiency, due to the elimination of transformer losses.

The vertical-roll edging stand motors are controlled by resistance-type magnetic starters, so that they may be



**V**ERTICAL Edgers, Which Form Part of the Roughing Mill, May Be Fitted with Rolls Grooved for Oval and Square Reduction Passes, Thus Increasing the Flexibility of Operation of the Mill

started or stopped independently of the other large motors. The eight large horizontal-roll stand motors are started by generator voltage control, and hence are all started together. Complete control of the 12 mill motors, the two 2000-kw., 600-volt main generators and the run-out table is concentrated on a control bench, located in a balcony on the wall of the main substation, overlooking the finishing stands. In addition, fine speed-control rheostats for the seven roughing and edging stand motors are located near the respective mill stands, so the floor opera-

tors may regulate operation of roughing part of mill.

Also of interest is the lubrication system, installed by S. F. Bowser & Co., Fort Wayne, Ind. It consists of a central filter plant which continuously filters all of the oil from all the bearings and gears in this mill, with the exception of the Timken roller bearings, which are packed with grease. This system, entirely automatic, is located in a basement room so that oil returns from the bearings and the gears by gravity. It is designed to handle heavy oil of 1550 deg. viscosity.

## Sponge Iron Varies in Grades

Its Value in Steel Making Depends on Quality—Experience in Melting Large Charges—Other Factors Affecting Its Use

BY N. K. G. THOLAND\*

**I**N his paper "Economic Aspects of Sponge Iron Production in Canada" Prof. Bradley Stoughton places sponge iron as a whole on a price basis with scrap. The author also brings out the fact that in particular cases the price of sponge iron can, as is the case with Swedish sponge iron, obtain a much higher level than scrap.

The writer of this discussion in a paper before the American Electrochemical Society at its annual meeting in Toronto, 1929, advocated strongly the necessity of viewing the value of sponge iron differently, when considering "commercial mass production of steel" and "high-grade steel production." It was then said:

### Sponge Iron for Commercial Steel Maker

In a paper presented in 1928 to the Swedish Iron Masters' Association, the present period of circulation of steel was found to be about 45 to 50 yr. After reviewing the various factors influencing the returns, the paper predicts that within this century the returned scrap will be equal to or exceed 50 per cent of all commercial steel produced. Accordingly the demand for "new iron" for commercial steel making, whether produced by the blast furnace, or by a sponge iron process, might be more or less than today depending on the total amount of steel produced at that time.

If sponge iron is to be produced as a base for commercial steels, this general circulation of iron must be taken into consideration. Furthermore, sponge iron must compete in price with iron from the blast furnace and with commercial high-grade scrap. There is evidence, however, that steels produced with a "commercial" sponge iron as a base will show sufficiently better physical properties to demand a premium in price, and thereby enable the steel maker to pay a better price for such sponge iron.

### Sponge Iron for Fine Steel Maker

For the maker of high-grade steels, such as tool steels, high-grade spring steels, wire steels, and various special carbon and alloy steels, the above given basis for valuation of sponge iron is not correct. The markets for these steels demand quality, and it may be safe to predict that the specifications of physical properties will not become easier, but more and more difficult to meet. While alloys in the scrap may be utilized for some particular group of alloy steels, their presence is naturally a growing objection not only to the manufacture of straight carbon steel, but

also to the manufacture of such alloy steels where the contaminating metals in the scrap, mainly nickel and copper, are not tolerated.

Prof. Stoughton states that the Swedish sponge iron obtains a price twice that of scrap. The writer wants to make this information more specific. The price obtained for the Swedish sponge iron today runs as high as \$60 per ton, delivered in the consumer's plant, while the seaboard price is \$44 per ton without duty.

### Different Grades of Sponge Iron

The possibility of regular sales at such prices in the "high grade" steel trade strongly emphasizes that a high value is possible on sponge iron. It depends on the qualities of the sponge iron, more so than on the price of scrap. Sponge iron should never be discussed without bearing in mind particular properties of different grades of the material.

Vital factors bearing on the quality of sponge iron are, as Prof. Stoughton clearly brings out, uniformity and amount of detrimental impurities, and also their physical and chemical existence in the sponge iron in question.

Among the "disadvantages of sponge iron" Prof. Stoughton lists that the material is liable to oxidize readily and thus is difficult to handle during the melting. This is only true under certain conditions and three years' experience from melting up to 40 per cent Swedish sponge iron (with a specific gravity of 2) in electric furnaces in the United States has not brought out a single instance of such difficulties.

In open-hearth melting non-compressed sponge iron will readily oxidize when struck directly by the flame but, if properly protected by the rest of the charge, no such difficulty exists. It should also be mentioned that compressed Swedish sponge iron (sp. gr. 6) has been melted in open-hearth furnaces to the extent of 70 per cent of the charge without any difficulties from oxidation.

A lengthy report on "Recent Economic Changes in the United States" was published last year and reviewed *in extenso* in THE IRON AGE, May 16, 1929, page 1363. Now comes a brief summary of the major work in the form of "An Audit of America," by E. E. Hunt (203 pages, 5x7½ in. McGraw-Hill Book Co., Inc., New York. Price \$2). The author was secretary of Herbert Hoover's committee which instituted the researches. Having been written during a period of intensive industrial activity and soaring security markets, the book will doubtless be read with interest in these more sober times.

\*Ekstrand & Tholand, 1 East Forty-second Street, New York. This is a discussion of a paper by Prof. Bradley Stoughton, Lehigh University, Bethlehem, Pa., delivered in Toronto, March 6, and abstracted in THE IRON AGE, March 13.

# Steel forgings containing Nickel

## Information for Users—Effects of Other Alloying Metals—Properties and Specifications—Trend in Heat Treatment

BY CHARLES MCKNIGHT\*

LARGE forgings constitute an important and constantly increasing field for alloy steel. The information regarding them is not nearly as complete or as readily available as the information pertaining to other forms of alloy steel. For example, the data published by the Society of Automotive Engineers on the properties, analyses and heat treatments of alloy steel are standard, but are not applicable to large forgings, as they are based on tests made on 1-in. bars.

It is the purpose of this paper to deal briefly with the manufacture, uses, analyses, heat treatment and properties of nickel alloy steel forgings larger than 4 in. in diameter or equivalent section. It will not convey any helpful knowledge to the manufacturer of forgings, principally because most that it contains has been gleaned from them. To the prospective purchaser and user it may be helpful.

### Fields of Application

At the end of last century, when nickel steels first began to be used commercially, the largest field of application was large forgings, such as armor, guns and shafting for naval vessels. Back in the '90's there were made for the Niagara Falls hydroelectric generators some weldless 3 per cent nickel steel field rings 12 ft. in diameter and weighing 14 tons each—masterpieces then, but small compared to some modern forgings. Today, while ordnance consumes relatively few forgings, the industrial demand is steadily growing in pace with the increase in the size of engineering units. Forged alloy steel is now employed for large shafts, turbine rotor and generator drums, gears, flywheels, pressure chambers, die blocks, Diesel engine parts, locomotive forgings, axles, extrusion dies, rolls and parts of steel mills, steam-hammer piston rods, hydraulic press rams, etc.

\*In charge, alloy steel department, International Nickel Co., New York. The article is from a paper delivered at semi-annual meeting in New York, Feb. 7, of American Society for Steel Treating.

It is usually specified that the steel may be made by any process—acid or basic open-hearth, acid or basic electric furnace. Each process has some advantages and there is not an overwhelming argument advanced for any one. The electric furnace, however, does not contribute a large proportion, due to the comparatively small size of most electric furnaces.

It is general practice to proportion the ingot mold to the size of bloom or forging to be produced from it. Forging molds are usually fluted. Most molds are top-poured. A hot-top is used and a generous crop (20 per cent) is considered requisite. Deoxidizers are sparingly used in the ladle and never in the mold.

The question of reduction from ingot to bloom and from bloom to forging has been a moot point for some time. As regards extremely large forgings it seems almost to settle itself, as unquestionably it is preferable to be satisfied with a smaller ratio of reduction than to run the risks involved in the use of extraordinarily large ingots with the consequent liability to segregation, cooling cracks and dendritic structure.

Similarly, there always has been some controversy as to the relative merits of hammering, pressing and rolling. The first two processes are used in the production of the actual forging; rolling is for the production of the bloom, intermediary between the ingot and the forging. Pressing is usually considered superior to hammering, but, again, the quality of the end product is the real answer. Some hold that the rolled bloom is superior to the forged bloom. There is, however, little dispute on one point. Blooms of alloy steel destined to be re-forged should be allowed to cool extremely slowly to avoid internal ruptures. It is quite general now to bury these blooms in ashes immediately after rolling or forging.

### Alloys Which Are Used

Alloys used in forging steels are nickel, chromium, molybdenum and vanadium. Each, added by itself, con-

Table I—Nickel Alloy Forging Steels

Type	Typical Analyses						Remarks
	Carbon	Manganese	Nickel	Chromium	Molybdenum	Vanadium	
3 per cent nickel.....	0.13-0.50	0.40-0.80	Min. 3.00	.....	.....	.....	General structural for strength and toughness.
2.5 per cent nickel.....	0.18-0.35	0.60-0.90	Min. 2.50	.....	.....	.....	Intended for normalized forgings. Heat treated usually by quench and temper.
Nickel-chromium.....	0.25-0.45	0.40-0.80	2.75-3.50	0.60-0.95	.....	.....	Slightly lower properties. For higher tensile values.
Nickel-chromium.....	0.28-0.42	0.40-0.70	Min. 1.25	Min. 0.70	.....	.....	"Krupp Analysis" for very high tensile values.
Nickel-chromium.....	0.25-0.50	0.40-0.80	2.75-3.50	1.25-1.75	.....	.....	Suitable for normalizing or quenching.
Nickel-chromium.....	0.20-0.45	0.40-0.80	Min. 4.50	1.25-1.75	.....	.....	Suitable for normalizing or quenching.
Nickel-molybdenum.....	0.25-0.40	0.60-0.90	2.00-3.00	.....	Min. 0.30	.....	Suitable for normalizing or quenching.
Nickel-chrome-molybdenum.....	0.25-0.40	0.40-0.80	2.00-3.00	0.60-0.95	0.30-0.60	.....	Suitable for normalizing or quenching.
Nickel vanadium.....	0.18-0.45	0.60-0.90	1.75-2.25	.....	.....	Min. 0.15	Suitable for normalizing or quenching.
Nickel-chrome-molybdenum-vanadium.....	0.25-0.70	0.40-0.80	1.25-1.75	0.50-1.00	0.20-0.30	Min. 0.15	High values. Phosphorus and sulphur usually specified under 0.045 per cent.

NOTE: In the accompanying table of specifications (Table II), certain steels are designated "K," "L" and "M" types. This is in conformance with the specifications for carbon and alloy steel forgings of the American Society for Testing Materials (A18-27). Their analysis is not specified. The required physical properties can be obtained from any of the nickel-chromium or other compound steels given above.

fers certain properties on steel. By a combination of one or more, where each complements the other, it is possible to produce properties not obtainable by the addition of any one element alone—thus, as a prominent metallurgist recently observed, adding two and two and obtaining six as an answer.

Nickel is added to steel primarily to obtain increased strength with toughness. It does not oxidize, does not contaminate the bath, as it has no impurities, and is recoverable from the scrap. Particularly important in the manufacture of large forgings, it has recently been established that nickel has a tendency to render steel more homogeneous and to lessen segregation. This is contrary to the prevalent belief.

Chromium is added primarily to harden and strengthen the steel. It acts to improve the properties, principally through the formation of carbides. It oxidizes during the process to some degree.

Molybdenum is very similar to chromium. It is more powerful than chromium in its effects, pound for pound, and, in addition, has the valuable characteristic of increasing the depth-hardening of steel and nullifying "temper brittleness." It acts for the most part through the formation of carbides. Like nickel, molybdenum does not oxidize and is recoverable from the scrap.

Vanadium acts as a toughener and strengthener of steel. It also forms carbides, but has the valuable property of reducing grain size. It oxidizes very readily and hence the addition of vanadium in the form of ferro-

vanadium must be made after the steel is well killed or it will be lost as an alloy.

Nickel alloy steels for forgings comprise the following group: nickel steels, nickel-chromium, nickel-chromium-molybdenum; nickel-molybdenum; nickel-vanadium; nickel-chrome-vanadium; nickel-chrome-vanadium-molybdenum.

**Nickel Steels:** Steel containing 3 per cent nickel was the first alloy steel used in quantity for forgings and has for years been a standard. Its use is indicated where carbon steels are inadequate and more strength, toughness and reliability required. It is used either in the annealed, the quenched-and-tempered or the normalized condition.

While steel containing 5 per cent nickel is not much used in this country for large forgings, its qualities have made it much more popular abroad, where for all alloy steels it is customary to use a higher alloy ratio.

One of the interesting uses of straight nickel steels is that of using a nickel steel of low-carbon content in order to obtain very great toughness and resistance to shock with only slight sacrifice of strength. Originally developed by one of our oldest forge companies for use in subway and street-car axles, this steel contained only 0.13 per cent carbon and 3 per cent nickel, thus approaching a pure iron-nickel alloy.

The heat treatment was the quench-and-temper, and it responded very nicely, on account of the low carbon, with practically no danger of cracking. Subsequently it was

(Continued on page 902)

Table II.—Specifications and Physical Properties of Nickel Alloy Steel Forgings

Type	Treatment	Size	Specifications										Remarks
			Tensile Strength	Elastic Limit	Elongation in 2"		Reduction of Area		Tensile Strength	Elastic Limit	Elongation	Red. of Area	
Carbon	Annealed	Up to 8" dia.	75,000	.5 Tens. Str.	Inverse Ratio	Min. %	Inverse Ratio	Min. %	75,940	43,860	36.2	66.7	8" Crankshaft
Carbon	Annealed	8"-12" dia.	75,000	.5 Tens. Str.	1,800,000	20.0	2,800,000	33.0	.....	.....	....	....	.....
Carbon	Annealed	12"-20" dia.	75,000	.5 Tens. Str.	1,725,000	19.0	2,640,000	31.0	.....	.....	....	....	.....
Carbon	Q. & T.	Up to 4"-2" Max. Wall	90,000	55,000	2,100,000	20.5	4,000,000	39.0	.....	.....	....	....	.....
Carbon	Q. & T.	4"-7" 3½" Max. Wall	85,000	50,000	2,000,000	20.5	3,800,000	39.0	103,050	68,250	23.0	51.9	Cylinder Forgings
Carbon	Q. & T.	7"-10" 5" Max. Wall	85,000	50,000	1,900,000	19.5	3,600,000	37.0	.....	.....	....	....	.....
Carbon	Q. & T.	10"-20" 5"-8" Max. Wall	82,500	48,000	1,800,000	19.0	3,400,000	36.0	.....	.....	....	....	.....
Carbon	Normalized	10"-20" dia.	88,000	43,000	.....	22.0	.....	35.0	88,000	47,500	25.0	42.0	Averages on Large Locomotive Forgings
3% Nickel	Annealed	Up to 12" dia.	80,000	50,000	2,000,000	22.0	3,600,000	40.0	.....	.....	....	....	.....
3% Nickel	Annealed	12"-20" dia.	80,000	50,000	1,900,000	21.0	3,400,000	38.0	103,000	65,000	21.2	45.1	Turbine Rotor—81" dia.
Low Carbon 2.5% Nickel	Normalized	10"-20" dia.	80,000	55,000	.....	27.0	.....	50.0	83,535	60,371	31.0	60.0	Averages on Large Locomotive Forgings
3% Nickel	Q. & T.	Up to 4"-2" Max. Wall	100,000	70,000	2,200,000	20.0	4,500,000	41.0	130,500	111,250	21.5	55.7	Disks—60" dia.
3% Nickel	Q. & T.	4"-7" 3½" Max. Wall	100,000	65,000	2,100,000	20.0	4,300,000	41.0	114,500	95,000	29.0	51.0	5% Ni. Steel Forgings 6" dia.
3% Nickel	Q. & T.	7"-10" 5" Max. Wall	90,000	60,000	2,000,000	20.0	4,100,000	41.0	95,000	67,000	24.0	52.5	Marine Crank 13x12.5" dia.
3% Nickel	Q. & T.	10"-20" 5"-8" Max. Wall	85,000	55,000	1,900,000	20.0	3,900,000	41.0	115,000	85,000	21.0	51.0	Press Column 36x24" dia.
3% Nickel	Normalized	10"-20" dia.	90,000	60,000	.....	22.0	.....	40.0	93,000	61,000	27.5	54.4	Marine Propeller Shaft 14¾" dia.
Ni-Cr. Steel Type K	Q. & T.	4"-7" dia. 3½" Max. Wall	90-110,000	65,000	.....	20.0	.....	50.0	100,630	72,350	25.3	64.7	75 mm. Gun Tube
Ni-Cr. Steel Type K	Q. & T.	7"-10" dia. 5" Max. Wall	90-110,000	65,000	.....	20.0	.....	50.0	96,060	72,560	24.3	60.4	150 mm. Gun Jacket
Ni-Cr. Steel Type K	Q. & T.	10"-20" dia. 5"-8" Max. Wall	85-105,000	60,000	.....	20.0	.....	50.0	.....	.....	....	....	.....
Ni-Cr. Steel Type L	Q. & T.	4"-7" dia. 3½" Max. Wall	100-120,000	75,000	.....	20.0	.....	50.0	100,130	76,950	25.0	62.0	77 mm. Gun Tube
Ni-Cr. Steel Type L	Q. & T.	7"-10" dia. 5" Max. Wall	100-120,000	75,000	.....	18.0	.....	45.0	175,000	135,000	16.0	50.0	Large Gear Forgings
Ni-Cr. Steel Type L	Q. & T.	10"-20" dia. 5"-8" Max. Wall	95-115,000	70,000	.....	18.0	.....	45.0	168,000	149,500	15.5	37.6	Ni-Cr.-Mo.-Va. Cylinders
Ni-Cr. Steel Type M	Q. & T.	4"-7" dia. 3½" Max. Wall	110,000	85,000	.....	16.0	.....	45.0	.....	.....	....	....	.....
Ni-Cr. Steel Type M	Q. & T.	7"-10" dia. 5" Max. Wall	100,000	75,000	.....	18.0	.....	45.0	143,500	110,000	15.7	50.0	Ni-Cr. Cylinder 18" dia.
Ni-Cr. Steel Type M	Q. & T.	10"-20" dia. 5"-8" Max. Wall	100,000	70,000	.....	18.0	.....	45.0	151,000	131,500	18.0	43.5	Ni-Cr.-Mo. 16" Forgings

# Jobbing Foundry Uses Conveyors

Several Trunk Lines Fed by Branch Lines from Machines

—Flexibility of Operation of Equipment and Plant a Feature—Large Savings Reported

BY SIDNEY G. KOON\*

**A** PROBLEM confronting the management of Eastern Steel Castings, Newark, N. J., several years ago was that of making the product at a lower cost. The business is almost wholly jobbing, and about three-fourths of all castings made are in lots of 50 or less. Evidently the mass production methods so largely exemplified in automotive work were not wholly suitable here.

Nevertheless, after careful study of all phases of the situation, it was decided to put into use those features of manufacturing on conveyors which could be adapted to the case in hand. Analysis showed that the greatest waste which could be attacked was that of man-power and particularly that involved in handling materials. Hence the study centered along the line of the use of conveyors to promote easy flow of materials, and to save

the back-breaking work common in foundry operation.

Along with the mechanical features detailed in succeeding paragraphs was developed a system of planning, routing and cost keeping, forming a production control method which has given excellent results. No longer are castings cleaned in the haphazard fashion commonly in vogue, as the present physical situation results almost automatically in keeping the floor clear of accumulations throughout the plant. This is merely one instance of the general stepping-up and tone of the whole conduct of producing castings in this organization.

No attempt was made to utilize a definite speed in the conveyor system as a pace-setter. Nevertheless it does, in practice, perform that function. But the diversified character of successive molding operations as performed here would not lend itself wholly to this method of attacking the problem.

Practically all of the con-

**G**ENERAL View in the Molding Department. The short, inclined conveyor run in left foreground takes the mold from machine toward pouring line at left

\*THE IRON AGE, New York.



veyors are of the gravity type or of the hand-push type, as will be described.

Because of the diversity in character of castings, both as to size and as to intricateness, the operation of the plant is divided into several sections. This was based partly on the company's possession, at the time of the change, of various types of molding machinery and on the necessity to use hand-molding methods for certain lines of work. The change was made only after a long-continued study, following visits to many plants all over the country. In making it, there was as little disturbance as possible, both of the building structure and of the existing equipment.

Hence, there are the floor molding department, roll-over machines, squeezers, etc., each of which requires a

mounted in oversize ball bearings for ease of operation, and are made to precision and to interchangeable standards. They are generally level and have no power. The molder finds it easy to shove a score or more molds along the conveyors. This pushing, however, is a function of the labor gang, which keeps the floors clear and the molds in motion.

Reaching the outer end of this short run of conveyor, which has capacity for a number of molds, the molds are transferred to the trunk line by means of a short section of rollers on a turntable. This again is on ball bearings and operates with the greatest ease.

A variant of this system, in the case of molds too heavy to be closed easily by one man, is found in those in which the drag and the cope are handled separately



**Swiveled Pouring Stand (Extreme Left).** Pouring station for 1000-lb. ladles suspended from monorail and serving two lines of conveyors is in center

somewhat different treatment in the handling of the product. In addition to the molding equipment, particular study was given to the core room, and a large amount of time was devoted to revamping the system of handling castings through the cleaning department, which is so often the "neck of the bottle." Pouring of castings was another feature which received thoughtful attention and which was worked out in especially happy fashion.

#### *Handling Molds on Conveyors*

VARIOUS sizes of molds are made in the plant, from flasks 16 in. square and capable of making a half-dozen small castings at once to flasks 4 ft. square or more, in which a single large casting is made. For small or moderate-size molds the procedure is simplest, in that the mold is made on the molding machine and then discharged directly to a line of roller conveyors, running at right angles to the trunk line which carries the molds to the pouring station.

All conveyor rollers are made of seamless steel tubing,

by two men on two machines, side by side. Here again they are run out to the pouring line on short transverse lines of conveyors, the row of copes on one conveyor line and the drags on an adjacent parallel line. After ten or so of each have been made, the cores are set and then the two molders, working together with the aid of an air hoist on an overhead beam, close the cope over the drag and run the completed mold out over the turntable and on to the pouring line.

In the other direction is the case of the smallest molds, which are placed in groups on carrying boards holding four or five molds. These boards have runners under them, near the ends, and so spaced that they fit on narrow lines of rollers, as shown in one illustration.

After the molder has put his four or five molds on such a board, he shoves it sideways toward the pouring line and then places on the roller rails alongside it another such carrying board for the next lot of molds. Thus, with these little fellows, there may be several carrying boards with their molds stored up between



**POURING** Small Castings in Molds on Long Bottom Boards. The boards ride sideways on track-like conveyor lines. Temperatures are controlled by optical pyrometer

Preparing to Close a Cope at Left Over the Drag at Right. The overhead hoist takes the weight, a special rig being used as shown. The pouring line is in left foreground



the machine and the pouring line. These again are run out on to the pouring line as convenience dictates, and take their place under the ladles in their turn.

Still another problem is that of the hand-molding department, where castings of varying sizes and shapes are to be made in molds, and only one or two, or a half dozen, perhaps, may be required of each pattern. Here again, however, use of the feeder conveyor lines is made, molds being prepared and pushed out over those lines in the same manner of handling as with the molding machines. Thus this department, which formerly was subject to the confusion usually attending such an operation, is on the same basis with regard to clearing of the ways as are the other molding departments.

Nothing can accumulate anywhere to block full operation so long as the molds are being poured about as fast as they are made. It happens that the pouring schedule is on, roughly, a 2-hr. basis, as this is the time required to finish the steel in the electric furnace after it has been melted in the open-hearth furnace and transferred to the electric unit.

#### *Providing for Flexibility in the Work*

**F**LEXIBILITY in these operations is provided in a number of ways. In the first place, the storage capacity of the various feeder lines, from all of the different molding operations, is about equivalent to five heats of steel from the electric furnace. This capacity is not utilized to pile up molds, however. They are kept on

the move, so that as little material in process as can possibly be arranged for is going through the works at one time. The fact that the excess storage capacity is there, however, takes care of any probable delays at the furnace, without in any way interrupting molding operations.

Another element of flexibility lies in the control which the management has of the speed of operation of each group of machines of the larger type. Mention was made above of the closing of molds by the two molders operating duplicate machines, one for the drag and the other for the cope. Several different speeds can be made in this particular unit by control of the number of men operating in it. As described above, this unit was run by two men, one for each machine.

It can, however, be speeded up if necessary by the addition of one or two or three more men, to a maximum of five. One additional man, who might serve two such units, will be the core-setter, whose work would relieve the two molders of that operation and thereby get the molds on the line that much faster. Two men added to such a unit would set the cores and close the molds. And the full speed of which the machines are capable might be utilized by expanding the crew to five men and using two of them continuously as molders, one as a core-setter and two for closing the molds and putting them on the pouring line.

To avoid discarding some of the old molding equipment which this plant had, means had to be taken to

**R**OLLER "Getaway" in Foreground Takes the Mold Directly from Machine. In rear at left more flasks and bottom boards are arriving.  
Steel flask storage behind wall





adjust this equipment to the new conditions. In cases where the molds were too heavy to be handled manually, and it was not convenient to give them either local or other crane service for that purpose, lines of rollers on an incline were run up to the table of the machines, as shown in one cut. This forms with the machine a work unit such that the operator can put the mold out on to the feeder rollers without too much physical effort. Much ingenuity was exercised in some of these instances, and a good deal of experimentation was required in placing equipment to the best advantage.

This remark applies as well to the core room, where the lines of supply of sand to the core benches and to movement of cores from the benches to the ovens were so arranged as not to cross each other. A number of core machines were so set with relation to the benches as to make for the greatest ease in making cores.

Core sand in hoppers at the back of the benches drops on a sort of shelf within easy reach of the operator's hand. Meanwhile the cores are handled from the benches on trays which deliver them to the ovens and thence either directly to the molding stations or, in some instances, to storage for later use.

#### Pouring Metal from Overhead Track

**H**EATS from the electric furnace are of 5 tons. Each is received in a bull ladle of that capacity. This ladle is then taken by the crane to a central position and deposited upon a pouring stand resting on a turntable (as shown). The pouring ladles are filled at this point. As they approach from two or three different directions, the rotating action of the turntable is utilized and they are filled by the tilting of the bull ladle by means of the crane.

When more than 1000 lb. is required in a ladleful, these larger ladles are handled by overhead cranes, for

**A**T the Shake-Out, Hauling Hot Castings Off the Grating into Boxes on Conveyor Line. All heavy weights are thus handled on rollers. Pouring station in center background

pouring the larger castings. It will be understood that the molds have meantime reached the pouring section on several parallel lines of conveyors. And all are carefully placed so that the gates are similarly located, mold after mold.

Three pouring machines of 1000 lb. capacity each are carried on a tramrail, which gives them a considerable longitudinal movement—perhaps 40 ft.—and on which they also have a lateral flexibility of a few feet, so that they may span two lines of molds. This constitutes a large portion of the pouring operation, as many hundreds of molds every day pass down these two lines, receive the metal and go on to the shakeout.

Still smaller operations are carried on with hand ladles, or with small ladles operating on the tramrail equipment but carried by power hoists, and pouring the smaller castings.

A minimum of trouble from spillage of steel is reported. Not over 20 or 30 rollers have had to be replaced from this cause in more than two years of operation on this equipment. Another source of trouble which might be anticipated, but which has been avoided, lies in the possibility of breakage of molds from banging together on the conveyor. This has not been experienced, as the gravity runs are so disposed that such bumping as takes place is not sufficient to break the molds.

Conveyor lines return the flasks to storage and bottom boards to the molding stations. Most of the flask storage (steel flasks) is in what was formerly a sand bin, in the rear of the main molding area. Here the flasks are sorted and kept segregated by size and type, and from this point they may be readily delivered. The bottom boards from the shake-out are simply continued on the line of conveyor, which makes a turn and carries them back to the molding machines.

(Concluded on page 906)

# More Metal Being Used in Planes

## Increasing Vogue of Steel, Aluminum and Their Alloys in Aircraft Discussed by Section of Mechanical Engineers

"PROBABLY one of the few opinions unanimously held by members of the aeronautical industry is that the airplane of the future will be all-metal." This statement, made by H. V. Thaden, vice-president, Pittsburgh Metal Airplane Co., Pittsburgh, at a conference of the aeronautic division of the American Society of Mechanical Engineers and the corresponding section of the Engineers' Society of Western Pennsylvania, held in Pittsburgh on March 12, introduced an interesting discussion of the potentialities of steel and aluminum and their alloys as materials for the future construction of aircraft, particularly planes of the "monocoque" type.

The advantages of metal airplanes as pointed out by Mr. Thaden are: Their life is longer, they can weather outside storage, they are more fire resistant, their structure is more homogeneous and crash resistant, and they lend themselves more readily to mass production methods. In the gradual trend toward the use of metal in airplane manufacture, some companies are merely making efforts to change the component wood parts to metal. In other cases component sub-assemblies are completely metalized, unit by unit. "The latter method," said the speaker, "is decidedly better than the former, but neither is as satisfactory as metalizing the entire structure, divorcing completely all wood or composite structural precedent. The problems involved in metalizing are distinctly different and are most successfully solved by reverting to fundamentals rather than to precedent.

### Should Standardize to Cut Costs

"Much research and experimentation are essential," continued Mr. Thaden, "and solution of the problems is influenced by a number of factors. Most important are business policy, choice of material, structural design and aerodynamic design. Of these four the first very largely influences the other three, as it has to do with such fundamental economics as cost of production, volume and profits. In practically all production work, the greater the number of similar articles produced, the cheaper they can be made, because of the better production machinery which can be profitably utilized. But production machinery, special jigs and dies are expensive and the volume of the airplane market is comparatively small. Engineering obsolescence is, and will be for some time, a most serious factor. Under these circumstances, some compromise solution must first be made to determine how much money can be justifiably spent for special machinery, jigs and dies in anticipation of a given volume of business.

"Airplane production is not today, nor likely to be for several years, in a class comparable with the automobile industry. Consequently, conservative judgment is necessary for the next few years and manufacturers should avoid installation of the most modern or most specialized

production machinery, because obviously the volume will not warrant such expenditures. It might be well instead to modify present designs in order to use the available production machinery, to simplify designs and to standardize as much as possible in order to reduce the cost price. As the volume increases, designs can be altered more profitably later to suit the automotive mass production methods."

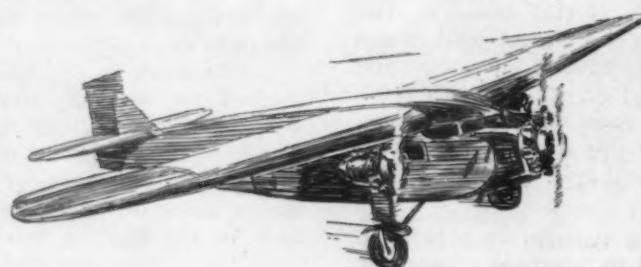
### Choice of Materials

In discussing the lighter and stronger materials that are constantly being developed and commercialized, Mr. Thaden stated that the three basic materials and their alloys which are today being used for aircraft construction are steel, aluminum and magnesium. "Of these," he said, "magnesium is still used only to a small extent, but its extreme lightness gives it interesting possibilities. Magnesium sheet in thin gages presents certain unsolved problems of which fire resistance and corrosion are the most serious. Castings and forgings, however, have a useful field for low-stressed parts, such as in secondary members.

"Steel," he went on, "has found extensive uses in aircraft in various classes from the medium carbon to the high alloy. Seamless tubing in both the carbon and in the chrome-molybdenum alloy is used predominately in fuselage structures, and also to some extent in the spars of wing structures. Forgings, where sufficient number of similar parts justify the expenditure for dies, form reliable members for the primary structure. Thin alloy steel sheet in strip form is used in numerous places, as it can be readily formed and welded. The sheet stock or the tubes, when welded and later heat treated, develop very nearly their full physical properties, but in the event that length or size makes heat treatment, after welding, impracticable, neither the physical qualities nor the fatigue resistance can be realized.

"Aluminum is being used in increasing extent both in the commercially pure state and in various alloys such as duralumin and alclad. The latter material has particularly good corrosion-resisting qualities because of the coating of pure aluminum with which it is surfaced. Aluminum alloy tubes have been commercially obtainable of duralumin only, but it is promised that they will also be made of alclad in the near future. Of the aluminum alloys, probably the best known is duralumin, which contains a small amount of copper. Under proper heat treatment this material finds very extensive use in the primary structure, as well as in the covering of an airplane. The fact that it has considerable more bulk for a given weight than steel makes it more resistant to secondary failure, such as the crinkling of the free edges.

"Extruded sections of du-



ralumin can be readily formed and offer wide possibilities for moldings and trim, as well as for primary structural members. To date, the minimum practical thickness to which this material can be extruded is about 1/16 in. Duralumin castings can be employed where stiffness or bearing area is required, but it seems somewhat hazardous to utilize them for tension members in a primary structure. Duralumin forgings have proved especially practicable and will unquestionably be used to a large extent. One of the advantages of aluminum alloy is the possibility of heat treating the material, subsequently forming and shaping it to size, and still retaining the ultimate physical properties by virtue of its 'aging' characteristics.

"Generalizing, it would appear that these various materials could be advantageously used in the following ways: For pure tension, the best materials from a structural and weight standpoint are the alloy steels. For pure compression in short columns the magnesium and aluminum alloys offer possibilities except in very highly stressed members. For bending and compression, the limitations of available space for the structure determine the most practical material. In the event that steel is used, the thinness of the material would probably be the criterion. Otherwise a bulkier material, such as duralumin, would work in more efficiently. In fact, the most serious limitation in the use of sheet metal of either duralumin or steel is the inability to use the material in the most economical sizes because of the stiffness factor."

#### Monoplane Best for Commercial Purposes

In Mr. Thaden's opinion, the monoplane makes the better commercial type of plane because of its simpler construction, the fewer number of parts and the greater aerodynamic efficiency. On the other hand, he pointed out that a biplane structure is more easily maneuvered because of its smaller moment of inertia.

"Internal cantilever wing bracing," he said, "which is of relatively recent origin, has developed to a degree where the weight involved is comparable with that in the externally braced biplane structure, or in the externally braced monoplane type. With the weights of the two types about on a par, the problem now revolves about the degree of profile resistance, unavoidably present with thick-profile sections required in the cantilever type, compared with the thin profile sections of the externally braced type with their extra strut braces. The trend seems to be toward the thicker cantilever wings, however, which have a higher lift, permitting lower landing speeds and quicker take-offs.

"In the matter of surface covering obviously the most efficient type is one with a smooth surface and conforming to a streamline shape. Rounding, or filleting of the corners of structural intersections and generally fairing the curves of an airplane structure tends toward high aerodynamic efficiency. A rectangular round-cornered, or elliptical fuselage is more efficient than a rectangular square-cornered type. In general, the fewer protuber-

ances from the essential portions of an airplane, namely from the wings and fuselage, the less power is required to propel the airplane through the air. Full-scale wind-tunnel tests indicate smooth metal as having the least surface skin friction, with, however, painted metal and unpainted plywood having only slightly greater resistance. The influence of corrugating the metal; with corrugations similar to those used by Junkers and Ford, is a relatively small factor when studied from the standpoint of performance.

#### Framed Structure Most Common

"Consideration of these various aerodynamic factors leads to certain conclusions regarding the most adaptable type of structural design. It has been reasoned that, if the outer cover is necessitated for aerodynamic reasons, and if a structure is required to carry the imposed loads, then it might be well to design the covering to serve both purposes. This line of reasoning has brought about another principle of structural design.

"Most airplanes today are designed on the basis of the determinant-framed structure type. Thus their design is based on fairly exact methods of calculation. The loads in each member being determinant, an economical primary structure usually results. Unfortunately, however, these structures, especially the fuselage, generally have aerodynamically inefficient cross-sectional form and their square or rectangular, or even triangular frames have to be padded up and the corners must be rounded to give the desired streamline to the structures.

This secondary structure is inefficient from a weight standpoint, besides being costly both in the initial manufacture and in field repair. On the other hand, the 'monolithic' or monocoque type of structure can be most easily made with rounded corners, rather than square, and the surface covering generally 'streamlines' its contours naturally. This type of structure is not calculable and must be tested statically to prove its strength. However, as the number of units of a given type increase with production, this disadvantage becomes negligible.

#### Ribs Metalized First

"In the two-spar biplane and braced monoplane wing structures, the ribs were the first elements to be metalized. This has been done by stamped sheet-metal ribs in the small sizes and by built-up framed ribs in the large sizes. Spars were next in development, and to date, dozens of different metal types, including the welded-steel truss spars, the stamped duralumin box, extruded duralumin, I-beams and high-strength alloy steel strip spars have been made. During the earlier stages of the development difficulties were encountered in equaling the strength-to-weight efficiency of an equivalent wooden spar. Recently, however, Government experiments have met with success and duralumin box spars superior to those of wood have been constructed.

"In the conventional framed type of spar-and-rib

structure the cover, for aerodynamic reasons, is generally made of fabric and, therefore, contributes no strength. It is improbable that a low cambered biplane wing can be efficiently covered with metal. A metal cover to be efficient must carry stress, and for this reason, the thicker monoplane, and especially cantilever, wings are most admirably suited. Inasmuch as a stiff cover is necessary for torsional strength in the cantilever wings, the metal type can be efficiently used.

"These factors are bringing about a change from the determinant type of framed-wing structure to the monolithic type in which the cover is stressed. A further structural step was to increase the number of spars, giving rise to a so-called multi-spar construction. In this case, either I, box, or tubular beams are used. In the absence of ribs, or closely spaced bulkheads, corrugated sheet must be used to attain the required rigidity between supports. A very efficient wing of this type is the Junkers in which a multiplicity of tubes acting as chord members and inter-connected by diagonal web braces is covered with corrugated skin riveted to the tubes.

"A still different wing structure, which, while not necessarily of a metal type, is being metalized, is the so-called 'mono-spar' wing. This single spar is designed to take only the bending moments. Diagonal wires helically disposed around the spar, or an entire sheet-metal covering on profile ribs is designed to take the torsional loads into the fuselage. The wing profile is generally one with a very small center of pressure movement.

"Another type of stressed-wing development is that one utilizing a large metal box or 'caisson' construction to which light leading and trailing edges are fastened. The box is composed of flat metal for the shear webs and a laminated top and bottom sheet metal chord conforming to the wing profile. Frequent transverse bulkheads are spaced along the interior. A further development of this box type of spar, has resulted in a so-called monocoque wing, in which the box structure extends entirely around the leading edge of the wing and an appreciable distance back along the chord of the wing. The spar chord members are tapered in plane and profile as well as in gage, making it possible to taper the strength of the spar in proportion to the air loads. Either corrugated or flat sheet may be used for its covering, although there is a decided advantage in the use of the corrugated sheet, as it greatly strengthens the chord members against buckling by secondary failures."

#### Development of Steel Propellers

In discussing the manufacture of metal propellers, Frank W. Caldwell, chief engineer, Hamilton-Standard Propeller Co., West Homestead, Pa., said: "An analysis of the problem of a solid-steel propeller for the Liberty engine indicated that a four-blade propeller, 11 ft. 6 in. in diameter, could be built to a weight of about 110 lb., with an improvement in efficiency of about 4 per cent. It was decided to build two blades of this type for destructive whirling test. These blades designed for 200 hp. were run up to 800 hp. before failure, the failure finally occurring in the hub and not in the blades. The test was sufficiently successful to indicate that the general type of design should be developed further.

"A second four-blade propeller of the same general design was next made up and run through a series of tests. This propeller failed in several places after a comparatively short test. The failure was traced to defective material. As the failure occurred in the outer part of the blades, they were gradually cut off until the blades were sufficiently rigid to run without vibration at all speeds. It now appeared that critical difficulty to be overcome in this type of propeller was the tendency toward torsional vibration or flutter.

"A new solid steel propeller, the third step in the development, was now built and this propeller ran smoothly at all speeds and passed a satisfactory whirling test on the electric testing stand. As a further check before permitting it to be flown, it was placed on a very rough eight-cylinder engine and run until failure. Failure occurred at the point of attachment to the hub. The blades were attached to the hub by a threaded connection with a clamp adjacent to the threads. Failure occurred at the base of the threads.

#### Propeller Blades of Solid Steel

"The fourth step in the development of the solid-steel blade consisted in modifying the hub design to double the cross-sectional area of the blade at the threaded section, leaving all other parts of the blade the same. This blade again passed a satisfactory whirling test on the electric motor, but again failed at the root of the threads when run on the engine.

"The last of these tests on solid steel blades were run about 1923. During 1922 some tests had been run on hollow blades of an aluminum alloy suitable for drop forging and it appeared that this alloy had very good mechanical properties. On account of the lower density of the aluminum alloy, its use made it possible to make blades of greater blade area and of greater stiffness than was possible with steel. It was thus possible to approach more nearly to the conditions existing in the best wood propeller practice.

#### Aluminum Propeller Blades

"In designing the first aluminum alloy propellers, the deflections which would occur under load were again studied and were compared with the wood-propeller practice and with the most successful of the solid-steel propellers. By designing for a flexibility intermediate between that of the smooth running steel propeller and that of the best wood propeller, it was felt that a serviceable design was fairly sure to be produced. At the same time, it was possible to hold the weight down to a figure only slightly above that of the existing wood propeller.

"It was also possible to use a diameter of the hub shank very much greater than had been possible in the steel propellers, so that the danger of breaking off at the threaded connection was greatly reduced. However, considerable study was given to eliminating any bending from the threaded portion and finally a device was adopted which consisted of a cylindrical wedge inserted between the blades and the hub at a point several inches out from the end of the threaded connection. It was hoped to absorb the drive through this wedge and eliminate the bending on the threads. The first solid aluminum alloy propeller designed and built along these lines was built by the Standard Steel Propeller Co. for the Army Air Corps and was completed early in 1923."

#### Basic Bessemer Steel for Rails

OFFERING arguments to disprove the idea that basic Bessemer steel is not a suitable material from which to make rails, L. Hacha in *Revue Universelle des Mines*, Vol. 2, 1929, discusses the technical details of the manufacture of ingots of basic Bessemer steel for rolling into rails. He points out that the spiegeleisen must contain a minimum of phosphorus, and that the lime must be correctly burnt and contain but little impurity.

The steel, he emphasizes, should be cast cold; the ingot molds must be clean, without cracks, of suitable dimensions, and at a convenient temperature. The ingots should remain in the mold for a predetermined time and should not be charged into the soaking pits too soon. The furnace atmosphere should be of a reducing character.

# To Cast or to Weld

BY MAURICE TAYLOR\*

A Comparison of Designs  
and Methods of Manufacture Offers the Solution of  
This Problem

THE best way to determine the true value of any one method of fabricating a machine part is by contrasting the advantages and disadvantages of one method with the advantages and disadvantages of other methods, or by showing qualities in one method which are not found in the others. Thus, in order to show the true value of arc welded steel construction, it is necessary to compare the qualities of this modern process of fabrication with the qualities of other methods, or to show that this process equals or surpasses the advantages claimed for competitive methods.

Two machinery bases shown in the accompanying illustrations, one of cast iron and one of arc welded steel, both designed for identical purposes, will serve to compare these two methods of fabricating this type of design. Cast iron construction was chosen for this comparison because in the past it has been the prevalent method of fabricating machinery bases.

These bases are designed for a small pump and motor. They are identical in size, loading and deflection. The size is 12 x 30 x 3 in. and the load consists of the weight of the pump and motor. There is no power take-off from the bases.

When fabricated of gray cast iron the base has a section area of 8.5 sq. in. When fabricated of structural angles and flat steel bars, the section area is 2.38 sq. in. The unit stress in the extreme fiber in tension of the cast base is 2000 lb. per sq. in.; that of the arc welded base is 4300 lb. per sq. in. The moment of inertia of the cast iron base is 5.39, whereas that of the arc welded base is 2.18. The distance to the neutral axis from the extreme fiber of the cast base is 2.308 in., and for the welded base 2.01 in. The cast base weighs 85 lb. and the arc welded base 38 lb. These figures may be checked by means of formulas in general use.

Welds at the lower corners of the arc welded steel

\*In charge of welding development, Lincoln Electric Co., Cleveland.

base are subjected to a load of 4300 lb. per sq. in. at the extreme fiber. It is assumed that the tension on these welds is 4300 lb. per sq. in. for 1 in. upward from the bottom surface; this is not a true condition as the tension diminishes at each point upward from the extreme fiber. The thickness of the angles at the weld is  $\frac{1}{4}$  in. Therefore, the pull or tension on the weld is one-fourth of 4300 lb., or 1075 lb. Reference to the accompanying table shows that a  $\frac{3}{16}$ -in. full fillet weld will safely withstand the load of 1075 lb. and is ample to join the members of the base.

#### Safe Unit Stresses in Tension and Shear\*

Size of Full Fillet Weld	Stress per Linear Inch
$\frac{1}{8}$ in.	1,500 lb.
$\frac{1}{4}$ in.	2,000 lb.
$\frac{3}{8}$ in.	2,500 lb.
$\frac{5}{16}$ in.	3,000 lb.
$\frac{3}{16}$ in.	3,500 lb.

\*For welds in compression, values 20 per cent above those given may be used.

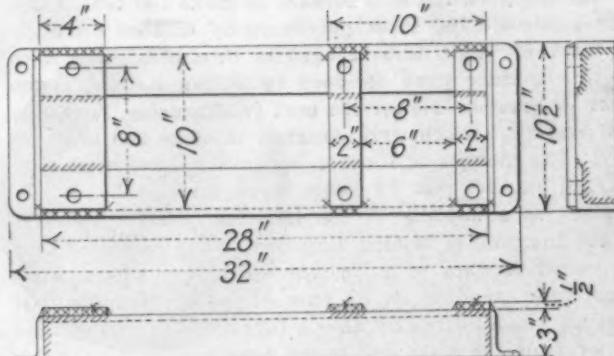
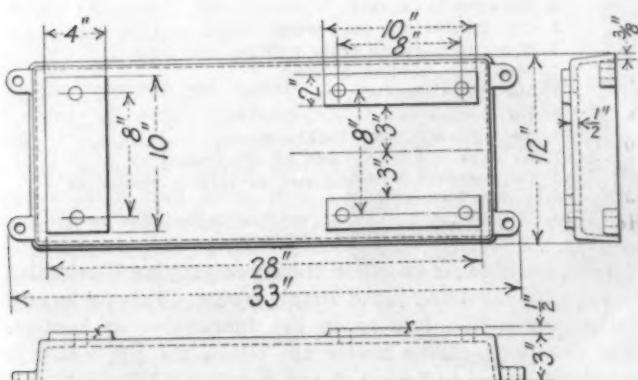
Following is a list of the material used in fabricating the arc welded steel base:

Part	Number	Loca-tion	Length per Piece	Weight in Lb.
$3 \times 2 \times \frac{1}{4}$ -in. angle	2	Ends	10 $\frac{1}{2}$ in.	7.2
$3 \times 2 \times \frac{1}{4}$ -in. angle	2	Sides	28 in.	19.2
$4 \times 10 \times \frac{1}{2}$ -in. bar	1	Pads	10 in.	5.7
$2 \times 10 \times \frac{1}{2}$ -in. bar	2	Pads	10 in.	5.7
Total	7			37.8

#### Assembly

Preparatory to assembly, the corners of the end angles are ground to suitable radius as shown in the drawing. Where appearance is not important the corners of the end angles may be left square, thus eliminating grinding operation which will reduce the cost. The flat bars which form the pads for pump and motor are machined before assembly, though this machining is generally unnecessary due to the smooth surface of rolled steel.

All parts are placed upside down in a jig, lined up properly, and clamped securely. The essential welding is



Small Machinery Base of Equal Strength, One in Cast Iron and the Other of Welded Steel

done on the underside of the base so that the welds are concealed when base is in normal position. Concealment of welds often proves a valuable aid in the improvement of a product's appearance.

The length of the welding necessary to make each connection is:

End angles to side angles:	
4 at 5 in. each.....	20 in.
Pad for pump to angles:	
2 at 4 in. each= 8 in.	
2 at 6 in. each=12 in.* .....	20 in.
Pads for motor to angles:	
4 at 2 in. each= 8 in.	
4 at 4 in. each=16 in.* .....	24 in.
Total .....	64 in.

\*These welds are not essential but may be necessary to promote customer's confidence in strength of base.

Comparison of costs has been worked out with the help of the planning and accounting departments of Lincoln Electric Co., as follows:

For Cast Iron Construction		
85 lb. cast iron at 6c.	.....	\$5.10
Drilling, grinding and machining..		1.50
Total cost .....		\$6.60
For Arc Welded Steel Construction		
26.4 lb. angles at 3c.	.....	\$0.79
11.4 lb. flat bars at 4½c. ..		.51
Cost of structural steel	\$1.30	
64 in. of welding at 25 ft. per hr. ....	.22 hr.	
Set up fatigue.....	.18 hr.	
Total welding labor.....	0.4 hr. at \$1	\$0.40
Electrodes and power.....		.30
Cutting steel to size.....		.15
Drilling, grinding and machining.....		.75
Overhead .....		1.25
Total cost .....		\$4.15

The arc welded steel base is lighter than the one of cast construction, yet its physical qualities are superior, and the cost of manufacturing is less. It is lighter because steel is six times as strong as cast iron, therefore, less material was required. Rolled steel is also cheaper than cast iron and therefore the arc welded base was manufactured at a saving of \$2.45, or more than 37 per cent. Prices used in calculating the steel are based on warehouse figures, but for a concern large enough to buy direct from the mill the cost of the steel would be still further reduced.

Heretofore cast construction has been looked upon as the correct means of producing machinery bases; however, the example shown above would seem to indicate that this is no longer true.

### Progress in Iron Metallurgy

FROM the little clay stack so common in India, where a bloom of 30 to 50 lb. is produced, to the modern blast furnace making a ton per minute, the history of iron smelting was traced by Charles Page Perin, of Perin & Marshall, New York, during a special lecture in a series on the progress in metallurgy given at Columbia University.

He described the first furnace to make 100 tons, which was a second-hand stack purchased by Andrew Carnegie in Hocking Valley and brought to Braddock. The lines of this furnace were designed by Julian Kennedy, who later was responsible for the next two furnaces, known as "B" and "C," which were designed to make 200 tons per day. The changes in furnace lines which have been most marked in the past 10 years were foretold by W. R. Walker at a meeting of the Iron and Steel Committee of the Institute of Mining Engineers when he stated that he looked forward to a furnace which would be a truncated cone standing on its base of major diameter, but that we would ultimately have a furnace with very limited batter from the stock line to the hearth.

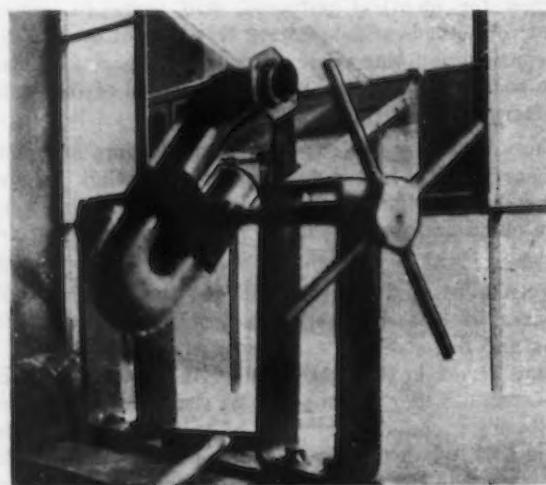
Mr. Perin said that there is still plenty of room in the iron and steel industry for university trained en-

gineers and for studies looking toward the elimination of waste. Some forty years ago there were not more than a half-dozen men in the industry who were college or university graduates.

In calling attention to the enormous waste that still goes on in the industry, particularly in the manufacture of thin sheet steel, he pointed out that the metallurgy of the future seems to be dependent largely on the development of the use of such metals as chromium, nickel, and perhaps copper. The manufacture of rustless irons and stainless steels are of incalculable importance in view of the fact that they will prolong the life of our deposits of iron ore. Within a century, which is a very short period in the life of a nation, the more cheaply mined and nearby deposits of iron ore will have been exhausted. Our dependence is becoming daily, greater upon iron and steel, and every intelligent effort should be given to prolonging the life of steel structures.

### Requirements for Jigs Used for Production Welding

ALTHOUGH welding jigs vary widely in design and appearance, from a very simple clamp to an intricate structure with many movable parts, all of them have a common purpose and all conform more or less closely to several requirements. The common purpose is, of course,



Jig for Welding Joints for Automobile Heater

to cut the cost of making the joints. The principal requirements, according to T. C. Fetherston, technical publicity department, Linde Air Products Co., New York, are that the jig should

1. Hold the pieces securely.
2. Be quickly loaded and unloaded.
3. Prevent incorrect assembly.
4. Be easy to operate.
5. Not distort nor mar work.
6. Prevent warpage from welding operation.
7. Permit inspection of weld.
8. Be easily cleaned.
9. Be inexpensive.
10. Be without undue bulkiness.
11. Be safe under any and all circumstances.
12. Be designed with an eye to relieve welder of fatigue.
13. Enable the important welding to be done in a down or horizontal position.

The movable jig shown in the accompanying illustration is a typical revolving jig of simple design. This jig is used in an automobile factory in the fabrication of heaters. The two parts of the heater are put in the jig, which is counterbalanced to hold it in any position. After welding, the jig is turned over and the second seam is welded in the horizontal position.

# Cutting With Carbide Tools

Results Compared with High-Speed Steels—Proper Rakes and Angles—Properties and Preparation of Tungsten Carbide

BY OWEN K. PARMITER\*

No other of the new high production materials has attracted the universal attention and interest that has been given cemented tungsten carbide. The advent of tungsten carbide as a material for dies and high-speed cutting tools is of a revolutionary nature. This hard, metallic substance is destined to change our ideas as to what constitutes machinable and non-machinable material. It is being used for cutting materials such as glass and porcelain which, heretofore, no other metallic substance has been able to cut. The extreme hardness of combined carbon and tungsten has been known for many years, but only within recent years have efforts been made to utilize its unusual properties commercially.

The intense hardness of tungsten carbide is comparable only with that of the diamond. Alone, it lacks sufficient toughness to be used for most industrial applications. In an effort to increase its toughness and strength, it is now used in the form of a fine powder held together by varying amounts of cobalt or other metals used as a binder. It is obvious that any toughening by increasing the binder must be accomplished without too great a sacrifice of hardness or structure. Depending upon the properties required, cobalt has been used most successfully in varying amounts from 6 to 13 per cent.

## Composition and Preparation

Tungsten combines with carbon to form two important carbides,  $W_2C$  and WC. The former,  $W_2C$ , has a composition of approximately 97 per cent tungsten and 3 per cent carbon, while the other, WC, contains about double that amount of carbon and only 94 per cent tungsten. The latter compound, the monocarbide (WC), is the principal constituent of the new cutting material.

In the production of this compound very pure and finely powdered metallic tungsten is intimately mixed with the proper amount of lampblack or some other suitable form of carbon. This mixture is exposed under an atmosphere of hydrogen to a high heat for a predetermined period of time. It is necessary that the resulting carbide exist as an extremely fine powder, which is then very uniformly mixed with the proper amount of cobalt powder of equal fineness. The resulting product, which must be worked for hours in a ball mill, the purpose of which is to coat each microscopic particle of carbide with cobalt, is then ready for compacting. Com-

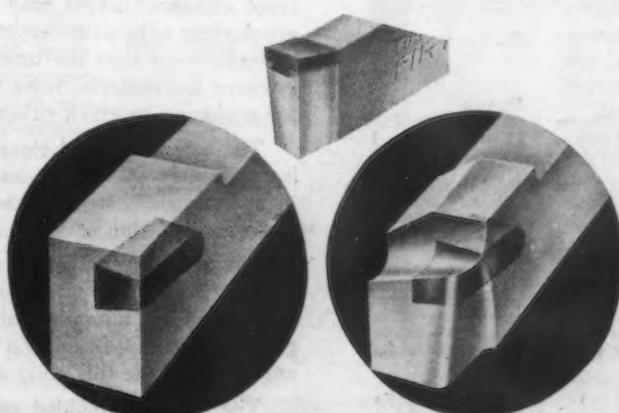
pacting is accomplished by pressing the finely powdered substance in suitable dies under hydraulic pressure.

It may then be partially sintered by heating to a temperature considerably under the melting point of cobalt. This first sintering operation puts the material into a condition in which it can be handled without crumbling and can be shaped by filing, drilling or sawing. The sintered shape is not really machinable in the sense that particles may be cut away in the form of chips, but the partially sintered powder can be removed with ease. After the die or tool tip is shaped, it is ready for the final sintering or cementing process, which is done at a white heat in a specially designed electric furnace under an atmosphere of hydrogen. As cobalt is the cementing material, a temperature closely approaching the melting point of that metal is used.

Thus, an intensely hard substance, with a very high compressive strength and a closely refined and uniform structure, is produced without actually melting or fusing the component parts. The method of producing this remarkable material by sintering, without fusion, opens up a new field in metallurgy, in that melting, forging and heat treatment are not necessary. Cemented tungsten carbide has no temper to be drawn; therefore, temperatures up to a good red heat have no effect upon its cutting properties. Its "red-hardness" surpasses that of any other metallic substance used in the tool industry.

There is some difference of opinion as to whether the combination of tungsten carbide with a metallic binder, such as cobalt, is really an alloy or whether it exists as an aggregate of extremely fine grains in a metallic matrix. Regardless of this technical point, we do know that it possesses a smooth, closely refined structure which closely resembles carefully hardened high-speed steel. Cemented tungsten carbide is highly resistant to the softening effect of high temperatures. It possesses an almost unbelievable resistance to abrasion. Some of the most interesting properties of this remarkable material are shown in one of the tables.

It is a well known fact that tungsten carbide will scratch the sapphire, and the sapphire, with a hardness of 9.50 on the Moh's scale, ranks next to the diamond, whose hardness on the same comparative scale is 10. As yet, no testing machines have been developed to accurately measure the extreme hardness of this metallic substance. By modifying the usual operating conditions of various testing machines and then interpolating and comparing results, it has been



Mechanically Held Tips of Tungsten Carbide on Tool Steel Shanks

\*Metallurgist, Firth-Sterling Steel Co., McKeesport, Pa. Part of an address on "High Production Steels" delivered before the New Jersey Chapter of the American Society for Steel Treating, March 11.

*Properties of Cemented Tungsten Carbide (WC) + CO  
Composition (Typical)*

	Per Cent	Hardness (Moh's Scale)	
	Per Cent	Per Cent	
Carbon	5.50		
Tungsten	86.50		
Cobalt	8.00		
<i>Specific Gravity</i>			
High-speed steel (18% W)	8.50	Diamond	10.00
Cemented tungsten carbide	14.50	Tungsten carbide	9.80
Metallic tungsten	18.70	Sapphire	9.50
Melting point of tungsten carbide		5,000 deg. Fahr. (approx.)	
Modulus of rupture (transverse)		275,000 lb. per sq. in.	
Modulus of rupture (hardened high-speed steel)		425,000 lb. per sq. in.	
Compressive strength (extrapolated)		540,000 lb. per sq. in.	
Rockwell hardness		75 C. (approx.)	
Brinell hardness		Over 1,500 BN.	

found that prepared tungsten carbide shows a hardness value in excess of 1500 Brinell, which is considerably more than double that of the hardest steel. The average surface hardness of nitrided steel is estimated at about 1000 Brinell.

**Preparation of Tools**

Being a costly material, cemented tungsten carbide is applied to cutting tools by inserting a small chip on a shank or holder of much cheaper material, usually some form of tool steel. The process of tipping is not without its difficulties. Serious complications have arisen in the past which have been partially and, in some cases, entirely eliminated by improved methods of inserting and holding the tip.

The first method employed for tipping was that of brazing the carbide material to the steel shank with copper, under an atmosphere of hydrogen. Such practice is apparently well adapted to smaller tools, and in most cases where it has been used on this type of tools it has given satisfactory service. For certain larger tools, welding seems to give better results and is usually preferred. Welding, however, is attended by the hazard of cracking the carbide tip itself, but, with proper manipulation, this can usually be avoided. While brazed and welded tips have

*Comparative Value of Cemented Tungsten Carbide as a Cutting Material*

Operation	Tungsten Carbide			Grinding		
	Time	Cost		Time	Cost	
Grinding 13 per cent manganese steel brickyard rolls....	7 hr.	\$35		17 to 40 hr.	\$70	
	Tungsten Carbide			High-Speed Steel		
Machining silicon steel rotors	Ft. per Min.	Pcs. per Grind		Ft. per Min.	Pcs. per Grind	
	350	10		125	1	
Axle steel, 0.45 carbon, 250 Brinell.....	Ft. per Min.	Time		Ft. per Min.	Time	
	70	1 hr.		30	2 to 4 hr.	
Boring mill, facing cast iron.....	Ft. per Min.	Time	Pieces	Ft. per Min.	Time	Pieces
	150	20	3 min.	50	1 hr.	1
Turning steel casting..	Ft. per Min.	Time		Ft. per Min.	Time	
	90	18 min.		36	45 min.	

*Comparative Production of Drawing Dies*

Die	Size, In.	Cost	Production
Chilled iron	0.105	4c. per hole (a)	Two to four coils
Diamond (b)	0.105	\$250 per die	1500 to 2000 coils
Firthaloy (c)	0.105	\$16.50 per die	About 1000 coils per size
Chilled iron	0.072	4c. per hole (a)	Two to three coils
Diamond (d)	0.072	\$200 per die	About 500 coils
Firthaloy (c)	0.072	\$16.50 per die	About 500 coils per size

given good results for ordinary work, there are some cases where results obtained from their use have not been satisfactory.

**Mechanically Held Tip**

The most recent development in the way of applying the carbide to cutting tools is that of the "mechanically held" tip. This improved method utilizes the combined effect of pressure and wedge action, at the same time protecting the tip against mechanical stresses and also strains due to temperature changes which occur from frictional heat while the tool is in operation. The "mechanically held" or "mechani-gript" principle will extend the use of tungsten carbide tools.

Another problem in connection with the preparation of a tungsten carbide tool is that of grinding. The ordinary grinding wheel is not suitable for this material. A wheel of special grain and hardness is necessary. The base material of such wheels, in most cases, is silicon carbide. The manufacturers of silicon carbide wheels in this country have done excellent work in developing abrasives that will satisfactorily grind this intensely hard cemented metallic substance. Wheels can be obtained that are equal, if not superior, to the best imported ones.

**Proper Rakes and Angles Important**

Since the first introduction of tungsten carbide cutting tools a great deal of time and effort has been spent in an endeavor to work out, on a practical basis, the proper

*Rakes and Clearance Angles for General Use of Cemented Tungsten Carbide*

Material	Front Clear- ance, Deg.	Side Clear- ance, Deg.	Top Slope Deg.	Lip Radius
Cast iron.....	6	4	3	...
Soft steel.....	6	6	12	3/4-1 1/4 in.
Medium steel.....	6	6	14	3/4-1 1/4 in.
Hard steel.....	4	4	14	3/4-1 in.
Non-ferrous metals.....	6	6	10-20	4-14 deg.*
Molded composites (non-metallic)	4-6	4-6	8-12	6-10 deg.*

\**Top Back Slope.* For all shaper or planer work, front clearance angle should be 3 deg. and tool should be given a negative top rake of from 3 to 5 deg.

angles, rakes and clearances for such tools. Contrary to the somewhat general opinion that rake and clearance angles of a cutting tool are not important, it is our opinion that they are of very great importance, especially in the application of this particular material. A recommended practice, given in a table, is outlined for the present time, being the result of practical shop experience in machining a number of different materials.

For cast iron, the angles given in the table have proved generally satisfactory. For work of small diameters the front clearance angle may be changed to 3 deg. As we are dealing only with cast iron as a general class, it should be understood that the introduction of any alloying agent removes the material from this class and thereby may call for a change in given rakes and angles.

The tool rakes and clearances outlined for the machining of steels of various hardness have given satisfaction in most cases. Steels of high alloy content may call for some modification of these angles.

The non-ferrous metal group includes such metals as copper, brass-bearing metals, aluminum, various grades of bronzes and numerous other alloys. These metals vary greatly in composition and machinability. The rakes and angles given for this class apply only in a general way.

The group of molded and composite materials includes such compositions as bakelite, textolite, hard rubber cel-

# Business Maladjustment Is Temporary

Depression Is World-Wide, But Money Market Indicates That  
Industrial Countries Will Be the First to Recover

BY DR. CHARLES O. HARDY

**D**EVELOPMENTS of the past month have thrown but little light on the probable duration of the current business depression. Different business indexes give contradictory impressions. Though reports of production in most basic lines show a gain in February over the January figures, the increases are not as large as those registered in January over December, and there are indications that the gains were not being maintained in the closing days of February and the first part of March.

It is not impossible that business may be repeating its course in 1924, when a decline in activity was interrupted by a sharp spurt in the first quarter, due chiefly to railroad and automobile activity, which was followed by a further recession running into the early part of the summer.

Steel production showed a 21 per cent increase in daily rate in February, on top of a big gain in January, and was in practically normal volume, though of course lower than in the boom months of 1929. The pig iron production rate also increased 11 per cent, to a figure only a little below normal. Automobile production rose sharply above the January figure, which in turn was more than double the December output. Cotton cloth was produced at a rate about 4 per cent above January, though nearly 10 per cent below February, 1929. Car loadings, when allowance is made for seasonal tendencies, showed a slight gain. New building contracts increased by about 15 per cent.

On the other hand, production of zinc, coal and copper declined. Reports of wholesale and retail trade are pessimistic in tone. There are widespread reports of extensive unemployment, but there are no statistics which make possible even an approximately accurate comparison with preceding periods. Employment and payroll reports made to the Department of Labor by manufacturing concerns indicate a very significant reduction of employment over the past six months. In spite of the statistics indicating a rebound from the low levels of productive output reached in December, sentiment on the whole seems less optimistic than it was in the opening weeks of the new year. The building situation, except for

**D**R. Hardy holds to his previous view that the current depression in this country is a temporary maladjustment like that of 1924.

He sees only a temporary slackening of activity in industrial parts of the world, but no prospect of early recovery in raw material producing sections.

public works and public utility contracts, is especially disappointing.

## Depression in Most Countries

**A**SIDE from the accumulation of added statistical measurements of the lowered rate of business activity, three items in the news of the month seem significant. These are, first, the rapid decline of prices, especially those of basic raw materials; second, the accumulation of evidence that the current depression is a world-wide phenomenon and not merely a local outgrowth of local financial disturbances; and, third, the progressive cheapening of money in American and



\*Commercial paper rates.

Changes in Central Bank Rediscount Rates Since Jan. 1, 1929

European financial centers, contrasted with tight money elsewhere.

The decline of prices has carried most of the popular indexes to levels approximating or even under-cutting the low levels of 1921. Particularly striking has been the weakness of the prices of such basic materials as rubber, coffee, silver, sugar, silk, tin, lead, zinc, coal, wheat, cotton, lumber and brick. In some cases, such as building materials, the decline appears to be due primarily to the falling off of demand, but in most cases the price level has been under pressure from the supply side for a long time and the curtailment of demand in the United States during the current recession has been only the proverbial last straw.

Reports of industrial distress—unemployment, falling production, slackened trade—come from practically all parts of the world, the notable exceptions being Russia, France and Switzerland. Particularly acute is the distress in Germany, in the Latin-American countries and in the Far East.

## Contrast in Money Rates

**W**HEN we turn our attention from statistics of industry and trade activity to financial data, the outlook seems more optimistic. The stock market has been strong and money has become available at lower and lower rates, not only in America but throughout Europe. The reduction of the New York Federal Reserve Bank rediscount rate to 3½ per cent on March 13 followed a series of similar reductions both in Europe and in this country, and an even more rapid decline of open market commercial paper rates. In other parts of the world, on the other hand, money is reported tight and collections bad.

The contrast between the money rate situation in Europe and America on the one hand, and in Latin America and the Far East on the other, may furnish a clue to a better understanding of the character of the economic difficulties through which the world is passing.

## Collapse of Buying Power as a Cause of Depression

**T**HE term "industrial depression" covers three quite distinct kinds of phenomena. First, there are the cases where industrial distress is due to the collapse of the buying power of

a community, caused by either a failure of demand for its principal product or the appearance of a competing supply from other parts of the world produced at a cost at which the community in question cannot compete. Such a depression has its roots deep in the economic order and often proves to be obstinate, sometimes indeed incurable.

Familiar historical examples are the agricultural depression in England and New England following the opening up of the agricultural resources of the interior of the American continent, the depression occasioned in the American colonies by the loss of trade advantages in the British West Indies after the Revolution, the decay of the prosperity of the wild rubber region of Brazil after the development of plantation rubber in the East Indies, and the agricultural distress in the United States and in other countries following the collapse of the artificial post-war demand in 1920.

Scarcely less serious is the development of an excessive investment in such a form that it cannot be converted to other uses, or the accumulation off the market of a store of products so great that its release threatens to demoralize the market. The disturbed conditions which center in the cotton, rubber, wheat, sugar and coffee markets are of this general type.

#### Overproduction and Changes in Money Values as Factors

A SECOND type of depression arises from changes in the value of money, usually connected with the restoration of the stability of currencies or shifts from one standard to another, such as occurred in this country in the 'Seventies and has taken place in the various European countries since the war. The depression of trade in silver standard countries is of this type.

The third type of depression, which bears only a superficial resemblance to these serious maladjustments, is the situation that arises when producers of manufactured goods or minerals, or middlemen handling them, overestimate the volume of consumptive demand and accumulate an excessive product necessitating a slackening of production until it is worked off, or when some shock to public confidence leads to an overestimate of the strength of the market and consequent curtailment of production and depletion of inventories. The current depression in the industrial centers of Europe and America, with the possible exceptions of Germany and England, is of this type.

#### Depression in Different Degrees

THE difference between these types of business depression registers itself in the effect on money markets. Depressions due to radical and more or less permanent impairment of the earning capacity of a community produce an excessive demand

for credit and reflect themselves in tight money. On the other hand, the minor depressions that arise from temporary maladjustment of the rates of production and consumption, or are due to the general anticipation that prices will fall on account of the change in the standard of the value, tend to cause easy money.

In the first case there is an excessive demand for credit to replace income, and a curtailment of supply because of the recognition that much

would probably aggravate their difficulties in the course of a few years by making it possible for them to accumulate bigger stocks and thereby peg prices for a longer time, with a bigger ultimate collapse.

The shrinkage of the purchasing power of so many countries will necessitate readjustment in industries producing for export, but, as was indicated in an article by the writer in THE IRON AGE for Jan. 23, the net effect of these price changes is to give the industrial parts of the world an advantage at the expense of raw material producing sections.

In conclusion, there is nothing in the current news to change the judgment of the writer expressed in previous articles, that the current depression in the United States is a temporary maladjustment of the type that we experienced in 1924.

#### Rapid Growth of New Jersey Steel Treaters

Celebrating the first anniversary of the formation on March 15, 1929, of the New Jersey group of the American Society for Steel Treating, announcement was made at the Berwick Hotel in Newark, Tuesday evening, March 11, that the board of directors of the national society had granted a charter, raising the status of the local organization to that of a chapter.

According to the custom of the society, a probationary period of about two years is usually necessary before a group may become a chapter. The growth of the New Jersey chapter borders on the phenomenal. Starting with 63 members a year ago, the chapter now has 225. In addition to this, the number of sustaining members, which was 25 on the first of February, has been raised to 41, and the prospects are that the number may be expanded to over 50. At present the chapter stands second in number of sustaining members, the first honor belonging to the Pittsburgh chapter, which has 51.

#### New Officers

A report of a nominating committee for new officers for the ensuing years was adopted and the officers selected. The new chairman of the chapter is H. D. McKenney, Driver-Harris Co., Harrison, N. J.; vice-chairman, John F. Wyzalek, Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.; secretary, John H. Johnson, Firth-Sterling Steel Co., New York; treasurer, R. W. Thorne, Colonial Steel Co., East Orange, N. J.

The speaker of the evening was Owen K. Parmiter, metallurgical engineer, Firth-Sterling Steel Co., McKeesport, Pa., with which company he has been associated for 23 years. The subject of Mr. Parmiter's address was "New High Production Steels." An enthusiastic audience of about 240 listened to a discussion on die steels, high-speed steels and tungsten-carbide cutting tools.

## Cartel Forming Sales Offices

Present Plan Would Control Output and Prices for Export and Affect Domestic Production—Opposition Expected

WASHINGTON, March 18.—Finding that its original plan of merely controlling the production of raw steel and limiting the output to a tonnage proportionate to that of world consumption supplied by members had proven insufficient, the Continental Steel Cartel is in process of fundamental change, according to a report prepared by the Iron and Steel Division, Department of Commerce. The statement is based on reports received from Paris.

It is now proposed to establish five international sales organizations to direct and control export and domestic sale, and consequently the production of semi-finished products, beams, shapes, heavy plates and sheets. Preliminary to this suggested arrangement, there has been formed a series of four export cartels, one each in the major member countries, to control export sales for a six-month period, beginning Feb. 1, during which time it is hoped that it will be possible to establish a permanent international organization.

Production control has not been definitely abandoned and much time is being devoted by the managing committee of the cartel to settlement of this question. While export control will make production control less necessary than before, at present only five important classes of products are to be regulated by the proposed sales organizations and abandonment of production control would leave many products without any check on output.

### Would Consider Unsold Domestic Tonnage

Present plans for operating the export sales organizations are still in formation and may be greatly changed. It is proposed, however, to determine for each member the tonnage of each of the five major products, which it may sell in export trade and in domestic markets. In this connection it is reported that the members have agreed that each country might increase its export quota by 50 per cent of its unsold domestic tonnage, although this proposal is tentative as indicated by the fact that France may receive a larger allowance, possibly 60 per cent. It has also been decided temporarily that an inverse procedure may be applied in the case of a decrease in export sales or by a percentage increase in domestic quotas.

The proposed apportionment of orders is to be made possible through authorizing the managing committee for each product to order a national group or an individual member to decrease exportation, or increase individual prices, transferring the tonnage which becomes available as a result to another group. A further

provision would permit, with the sanction of the national cartel, a transfer of this tonnage to any one member in another group.

It is believed that this procedure may be unpopular as the names of the customers of the producer at fault may eventually become generally known. Proponents of the plan, however, claim that a producer has only to keep within his quota to prevent his commercial secrets from being disclosed and that if the identity of his clients becomes known throughout the

trade, he has only himself and his overproduction to blame.

"It will not be to the interest of producers to force production above a certain level, nor will it be possible for any one group to profit personally to any great extent by the difficult situation of another rival group as might now be the case in the event of a prolonged strike shutting down the works of the unfortunate producer," says the Department of Commerce report. "Further, as the mills will scarcely find it to their advantage to produce more than they can readily sell, and since all sales will be effected and recorded by the export and domestic sales comptoirs to be erected, both national and international, it seems that overproduction will be virtually eliminated."

## Chrome-Nickel Plates at Assouan Dam

Rustless Steel to Go Between New Buttresses and Face for Reinforcement of Egyptian Dam Constructed in 1892

(Special Correspondent)

LONDON, Feb. 28.—Considerable interest has been aroused by the fact that the engineers in charge of the extension work at the Assouan Dam on the Nile recommended the use of stainless steel in the buttresses. This was quite an innovation. The dam is 1½ miles long, and was built in 1892. At the end of 1928 an international commission inspected it and reported on the necessity of further raising and strengthening it. Accordingly, it was decided to erect masonry buttresses between the sluices, but instead of these being fixed to the face of the dam, they are to be laid against a layer of rustless steel plates placed against the face. The buttress thus becomes a live load. These high chrome-nickel alloy plates are 7 mm. (0.28 in.) thick, and of varying sizes to suit the dimensions of the masonry buttresses in conjunction with which they are to be used.

British makers of chrome-nickel alloy steel were keenly disappointed when it was learned that this important contract had gone to Sweden. The quantity originally specified 1200 tons of Firth's chrome-nickel alloy steel. The successful tender of the Swedish works was £100 (\$486.60) a ton, totaling £120,000 (\$583,920), but the quantity was increased subsequently to 1500 tons, with deliveries distributed over three years.

The possibility that British makers would not receive this order seems never to have been considered, either by the proprietors of the brand specified or the licensees. Consequently, no effort was made toward modifying the price to meet competition, which seems to have been a miscalculation. Steel makers in various countries are producing high chrome-nickel alloy under license, and most of these producers appear to have made bids, even the United States figuring in the competition.

The contract is understood to have been awarded entirely on price, the business going to the lowest bidder. Certain makers, however, profess not to regret having lost the business, claiming that the process of manufacture is difficult, especially in producing material of consistent quality even in small quantities. It is regarded as regrettable, however, that a foreign works, operating under a British patent, should secure valuable orders in competition with British patentees, themselves operating under the patent.

## South Africa Asks Bids on Ore-Crushing Plant

For the steel plant which is to be erected at Pretoria, South Africa, bids are now being asked for an ore-crushing plant. Besides the crushing equipment, the necessary buildings and wagon hoists and electrical equipment are included. The tenders must be submitted by noon of June 14 and may be delivered on that date to Pretoria or Johannesburg, or to South Africa House, Trafalgar Square, London, or to Barclays Bank, 44 Beaver Street, New York. Three copies of the specifications will be supplied on receipt of a deposit of £25.

The steel plant is that of the South African Iron & Steel Industrial Corporation, Ltd., and the work of design and construction is in the hands of a Committee of Consulting Engineers, which may be reached for further information in care of the International Construction Co., Ltd., 56 Kingsway, London, W. C. 2, England.

Sloss-Sheffield Steel & Iron Co., Birmingham, has purchased from Frey Engineering Co., Chicago, two Frey design continuous stock-line recorders.

# Electrolytic Deposits with Fast Colors

## Commercial Method of Coating Aluminum with Durable Flexible Finish

A N electrolytic method of applying a protective and decorative coating to aluminum and its alloys has been developed for commercial use. The plated material is known as Alumilite, and it may be had in silver white, black, or in various shades of blue, yellow, red, brown, green, and purple.

According to J. C. Patten, president, Metals Protection Corporation, Indianapolis, this coating is an integral part of the aluminum itself; it will not chip or peel. Treated sheets may be stamped and formed into such shapes as camera bodies, soap dishes, ash trays or hub caps, without marring the finish. Alumilite is said to offer unusual resistance to atmospheric and salt water corrosion, especially when the base is relatively pure aluminum, because it generally has a homogeneous and continuous surface. Samples subjected to the salt spray test have resisted 5000 hr. The coating in almost all colors is not affected by hot water or steam. It does not protect aluminum from acids and alkalis, but is effective against the corrosive action of certain chemicals.

A test of the resistance to abrasion, comparing this new finish with other metals and finishes, was made on a stitched buffering wheel, using a nickel buffering composition, and it showed more resistance to wear than a heavy nickel plate.

Aluminum melts at 1216 deg. Fahr. The new coating has a melting point somewhat in excess of this temperature because a treated sheet of aluminum can be heated until the aluminum within the coating melts, while the coating itself remains intact. This indicates that the protecting coating will not be injured under conditions of friction where the unprotected aluminum surface would be scored. The finishes now available do not change color at temperatures under 500 deg. Fahr.

It is well known that black or other dark colored finishes absorb heat much better than ordinary aluminum, and this fact suggests some uses for the new material. Tests show that water in an aluminum kettle, with the bottom plated black, will boil in half the time required in a plain aluminum kettle, other conditions being equal. This effect will be more apparent and of great advantage on utensils used with electric stoves.

From 90 colors that have been subjected to fadeometer tests by several testing laboratories, a group of varied colors have been found that will not fade, even under the severe test of 300 hr. fadeometer exposure. These are the groups now produced by the new process. Since Alumilite itself is hard and does not tarnish, it will not injure or discolor other articles with

which it comes in contact. This quality is particularly advantageous on such articles as serving trays, compacts, spectacle frames and cases.

Details of the process are not yet released, but it is said that there is no application of heat in the Alumilite process higher than 100 deg. C. Consequently there is no annealing or warping of the base metal.

The treated aluminum surface absorbs oil and certain lacquers; it is, therefore, a good base for materials that provide added resistance to corrosion and abrasion. The lacquer can be applied by spraying and, when applied heavily enough, will result in a finish of metallic luster. This type of coating is particularly advised where a highly insulated product is required for certain electrical purposes, the Alumilite itself being an excellent insulator.

Installation cost of the necessary plant will ordinarily be less than 80 per cent of the cost of a nickel-plating plant of like capacity, it is asserted, and the operating cost will range from 30 to 75 per cent of the cost of nickel plating. Aluminum articles free from grease do not have to be cleaned, neither are they buffed after treatment. All the above claims are said to be substantiated by commercial production in plants of some of the leading American manufacturers of photographic and optical goods.

For purely decorative purposes, the field of application almost coincides with the use of thin sheet metal for utensils and for cameras, compacts, boxes, name plates and automobile trimmings. Because of Alumilite's resistance to the corrosive influences of industrial atmospheres and to sea water, the following important applications are apparent: Marine fittings and instruments, and airplane parts, such as propellers, motor castings, struts, and sheets for wings and fuselage.

### Double-Disk Grinder for Continuous Production

NEW double-disk grinders in a range of sizes from 3 to 10 hp., and using disks from 12 to 24 in. in diameter, have been placed on the market by the Hammond Machinery Builders, Inc., Kalamazoo, Mich.

The machine is equipped with a totally-enclosed motor, cooled by a fan



Disks Are Machined on Both Sides and Are Reversible, So That Two Disks Can Be Mounted on the Same Wheel

mounted on the spindle. Incoming air passes through an air cleaner, entrance of grit and dirt into the motor being thus prevented. The motor has high overload capacity and is capable of withstanding severe momentary shock without excessive heating.

The chrome-nickel steel spindle is large, and is ground and balanced. Bearings are designed to absorb both radial and lateral thrusts. The disks are machined on both sides to permit mounting abrasive wheels on both faces. After one is worn, the disk

can be reversed, and in this way twice the number of service hours may be had with one operation of mounting and changing the disk wheels. Standard equipment includes one plain table and one lever table, but the machine can be equipped with two of either type if desired.

Push button control in the front of the pedestal is mounted in a recess to prevent accidental starting. Cutler-Hammer automatic motor starter with overload, low voltage and phase failure protection is standard equipment; it is mounted on the pedestal door.

### Pennsylvania to Spend \$60,000,000 for Equipment

WASHINGTON, March 18.—The Pennsylvania Railroad has applied to the Interstate Commerce Commission for permission to issue \$60,000,000 equipment trust certificates for the purchase of supplies and equipment. The road has been authorized by its board of directors to issue an additional \$40,000,000 for the purchase of equipment. The application filed with the commission did not itemize the equipment to be purchased.

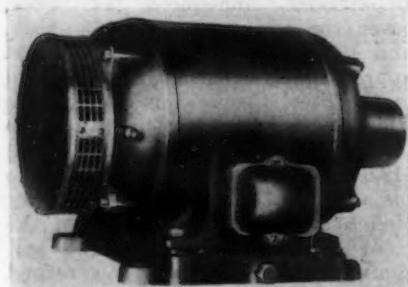
The Chicago, Milwaukee, St. Paul & Pacific Railroad has filed an application to issue equipment trust certificates to cover the purchase of 2300 steel underframe cars and a small amount of other rolling stock, together with some machinery items. The contracts have been awarded and involve approximately \$5,693,968.

Cleveland Planer Co., Cleveland, has appointed Knickerbocker, Cram & Co., Inc., 7 East Forty-second Street, New York, as sales agent for its line of open-side planers in the New York territory.

## New Line of Fan-Cooled Induction Motors

**TOTALLY-INCLOSED** squirrel caged induction motors cooled by means of a fan mounted outside the motor housing are being produced by Century Electric Co., St. Louis.

The fan mounting, on the front end of the housing, can be seen in the illustration. Moving parts of the motor and the stator windings are in-

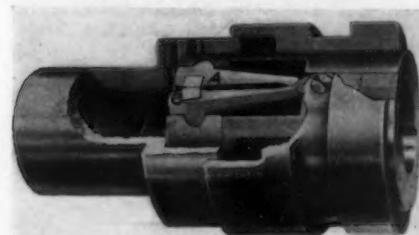


The Fan Is Mounted Externally and Cooling Air Is Drawn in at the Pulley End

closed in an air-tight cell formed by ribbed cast-iron coil guards within the outer housing. Cooling air is drawn into the housing through vents on the rear end of the motor, circulated around and over the rear coil guards, through passages between the field core and frame, over the front coil guards, and into the fan housing. The fan discharges through the vents arranged around its circumference. Its blades are radial, and the cooling system is equally effective regardless of the direction of rotation. Air passages are designed to prevent clogging, and can be easily cleaned with compressed air. Provisions are made to circulate the air within the motor shell and transfer the heat to the radiating surfaces. The new motors will be made in most of the standard ratings. According to the makers, they compare favorably in size with standard rated open motors.

## Chrome-Nickel Steel Fingers Feature Improved Clutch

**T**O increase the wearing qualities and reduce breakage to a minimum, the Carlyle Johnson Machine Co., Manchester, Conn., is equipping its new Super-Clutch with chrome-nickel steel fingers. Formerly, drop-forged carbon-steel clutch fingers (also called clutch levers or toggle levers and shown below at A) were



Chrome-Nickel Steel Clutch Fingers Increase the Wearing Qualities

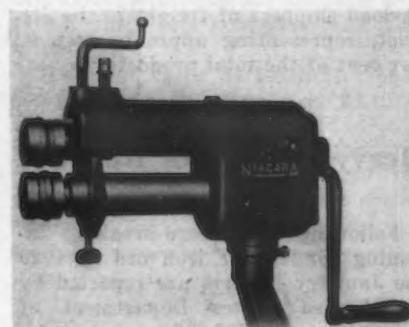
used in the Johnson friction clutch.

Another improvement is in the method of locking the adjusting screw, by means of which the adjustment of the clutch is said to remain as set by the operator and is not affected by high speed or vibrations. Use of chrome-nickel steel adjusting blocks in place of tool steel blocks is intended to eliminate breakage due to fire cracks which sometimes occur in the hardening of those parts. A fourth feature of the new clutch is the use of Alemite lubrication. Grease, applied at only one point on the clutch, is forced under pressure into the interior of the clutch, where it is retained and continuously lubricates all parts. Dripping or throwing of oil is thus eliminated.

## Beads No. 22 Gage and Lighter Metal

**F**OR beading operations on sheet metal up to No. 22 gage, the Niagara Machine & Tool Works, Buffalo, has brought out a new 8 1/4-in. throat machine, designated as the No. 193. Rolls, 2 1/2 in. in diameter and 1 1/4 in. long, are used.

Arrangement of the machine may be seen in the illustration. The upper shaft is raised and lowered by means of a quick-acting crank screw. Steel



The Upper Shaft Is Raised and Lowered by Means of the Crank Screw

connection gears are machine cut, entirely inclosed, and are mounted so that they will not come out of mesh. Rolls are of case hardened steel. They are held in place with countersunk nuts, which keep the faces of the rolls flush with the ends of the shafts. A polished, faced gage with large gaging surface is held in the desired position with a rigid thumb screw.

One pair of 3/8-in. O.G. beading rolls, one pair of 5/16-in. single beading rolls, bench standard, and a wrench are standard equipment. Single beading rolls, 3/16 in., 5/16 in. or 1/2 in. size, straight crimping rolls and spiral crimping rolls can be furnished extra.

The Division of Simplified Practice of the Bureau of Standards has announced that recommendation R115-30, relating to full disk buffing wheels, has been accepted by a sufficient number of fabricators, dealers and users to insure general adoption.

## Compact Electric Soldering Iron Heater

**A PORTABLE** electric soldering iron heater, which can also be used for annealing and hardening small parts, has been placed on the market by the Bellevue Industrial Furnace Co., 2971 Bellevue Avenue, Detroit.



Although Designed for Heating Soldering Iron, This Electric Heater May Be Used Also for Annealing and Hardening Small Parts

The heater is equipped with "Globar" cartridge-type heating elements which may be replaced conveniently while the furnace is at full heat. It can be attached to any 110-volt line and takes 15 amp. No blowers or other auxiliary equipment are necessary for operation.

Overall dimensions are: Width, 15 1/2 in.; height, 13 1/2 in.; and depth 13 1/2 in. The opening is 4 1/2 in. wide and 1 1/2 in. high; the chamber is 5 in. deep. The heater is furnished with an indicating snap switch, mounted as shown, and 10 ft. of flexible cord and an attachment plug.

## Trailer for Handling Hot Strips and Plates

**A TRAILER** designed for heavy duty steel mill service has been placed on the market by Mercury Mfg. Co., Chicago. Designed particularly for handling hot steel strips and plate, the trailer is provided with a one-piece cast-iron frame, which is emphasized as withstanding extreme heat without warping.

This trailer, designated as the Mercury Type A-390, is a caster steer vehicle, 3 ft. wide, 10 ft. long and 22 in. high, and weighs 2700 lb. The load capacity is 10 tons.

"Corrosion-Resistant Alloys in General Fabrication" is the subject of an attractive catalog issued by the Downingtown Iron Works, Downingtown, Pa. The 24 pages include analyses and physical properties of several types of chrome-iron and chrome-nickel-iron alloys and descriptions of the uses to which the large fabricated towers and tanks are put. It is written by T. Holland Nelson, consultant metallurgist for the company.

## Sharp Recovery in Industrial Machinery Exports

Although exports from the United States of industrial machinery reached the record-breaking total in 1929 of \$257,000,000, there was a distinct falling off at the end of the year. January exports of this type of machinery, however, turned sharply upward, according to a statement of the Industrial Machinery Division, Department of Commerce. The total for that month is reported as \$23,336,003, compared with \$20,417,178 in January, 1929. This increase is about 14 per cent and the January figure exceeds that for December by nearly 20 per cent.

All of the principal items show substantial gains with the exception of steam engines, water-wheels and turbines, power pumping equipment, textile, sewing and shoe machinery. Particularly sharp increases were reported for oil well and refinery machinery, mining and quarrying machinery, and construction and conveying machinery. Comparison of the two Januaries is covered in the accompanying table.

A diagram showing the exports of industrial machinery for the eight years beginning in 1922 appeared on page 595 of THE IRON AGE of Feb. 20.

## Babbitt Consumption Gains

WASHINGTON, March 14.—The total apparent consumption of Babbitt metal in January was 4,438,455 lb., as compared with 3,343,492 lb. in the previous month and 6,093,267 lb. in January of last year, according to reports received by the Department of Commerce from 31 firms.

## Expect Only Slight Drop in Pittsburgh Steel Shipments

Manufacturers of iron and steel products in western Pennsylvania, eastern Ohio, northern West Virginia and western Maryland expect a decrease of only 3.7 per cent in their freight car requirements for the second quarter, as compared with the corresponding quarter last year, according to their reports to the Allegheny Regional Advisory Board at a meeting held last week in Pittsburgh. This is notably significant in view of the fact that steel production and shipments in the second quarter of 1929 undoubtedly exceeded all previous three-month periods. Makers of brass, bronze and copper products expect a decrease of 14.8 per cent; castings, 7.4 per cent; iron and steel scrap, 7.8 per cent; tin plate, 7.9 per cent, and sanitary ware, 25 per cent.

Industries in the metal trades reporting expected increases were machinery, 14.6 per cent; boilers, 36.9 per cent; agricultural implements and vehicles, 9.1 per cent, and electrical goods, 5.5 per cent. The forecast is based upon individual opinions of 713

## United States Exports of Industrial Machinery

Class of Machinery	January	
	1929	1930
Power generating, except electric and automotive:		
Steam engines(a).....	\$948,743	\$626,586
Internal combustion engines(b).....	901,126	959,316
Water-wheels and water turbines.....	26,247	20,439
	\$1,876,116	\$1,606,341
Construction and conveying machinery.....	1,814,354	2,861,649
Mining, oil well and pumping machinery:		
Mining and quarrying.....	1,339,875	1,842,341
Oil well and refining.....	1,938,678	2,674,228
Pumping, power(c)....	804,023	627,596
	\$4,082,576	\$5,144,165
Metal-working machinery:		
Power driven.....	2,531,415	3,215,109
Other .....	586,465	646,341
	\$3,117,880	\$3,861,450
Textile, sewing and shoe machinery:		
Textile machinery.....	1,119,712	1,039,494
Sewing machines.....	427,123	301,736
Shoe machinery.....	205,837	158,910
	\$1,752,672	\$1,500,140
Other industrial machinery(d) .....	7,773,580	8,362,258
	20,417,178	23,336,003

(a)Excludes locomotives.

(b)Excludes engines not over 10 hp.

(c)Excludes windmill pumps; also parts of pumps.

(d)Includes mine cars

that Sweden was ahead of French Africa in December, the same order prevailed during that month.

## U. S. Steel Gets Tax Refunds of \$33,555,356

WASHINGTON, March 18.—Refunds of \$33,555,356 to the United States Steel Corporation by the Treasury Department, announced last week, cover the tax years of 1918, 1919, and 1920, and it was reported that approximately \$16,500,000 will be paid to the Steel Corporation and that it will not be required to pay any 1929 taxes, which would amount to about \$17,000,000, the two sums equal to the amount of the refunds. Secretary Mellon said that as a result of the refunds the Steel Corporation's suit against the Government for a refund of \$130,000,000 will be dropped, while the counter claim of \$77,000,000 instituted by the Government against the Steel Corporation also will be abandoned.

carload shippers of freight in the district, representing approximately 92 per cent of the total production.

## Heavy Imports of Iron Ore Continue

Following the record-breaking incoming tonnage of iron ore in 1929 the January imports are reported by the United States Department of Commerce at 292,835 gross tons. This is an increase of more than 2 per cent on December and about 65 per cent greater than the corresponding figure for January, 1929.

The total is considerably greater than the average month of last year, and, with the exception of July and August, is greater than the incoming shipments of any month of 1929. With those same exceptions and August, 1927, this tonnage is the greatest since that of July, 1923.

Chile provided considerably more than half the total of incoming ore, reaching 64 per cent of all. Cuba was in second position, French Africa third and Sweden fourth. Except

Stocks of anthracite and bituminous coal in industrial hands Feb. 1 are estimated by the National Association of Purchasing Agents at 37,078,000 net tons. This is a reduction of 5 per cent from the Jan. 1 figure of 39,007,000 tons, and is the smallest total since that of Oct. 1. Consumption during January is figured at 38,512,000 tons, which is the smallest total since that for September last, but was only slightly under the December figure.

Stocks are estimated as about 28 days' supply on the average, with by-product coke plants having enough for 28 days; electric utilities, 43 days; coal gas plants, 57 days; railroads, 22 days; steel mills, 27 days, and other industries, 29 days.

Output of bituminous coal has declined considerably of late. The decline has averaged about 1,000,000 tons a week, production for the week ended March 1 having been 8,200,000 net tons, compared with 10,224,000 tons two weeks earlier. For the coal year (since April 1) the total has been 482,493,000 net tons, or about 2 per cent more than in the same period of the preceding year.

## SOURCES OF AMERICAN IMPORTS OF IRON ORE

(In Gross Tons)

	January, 1930	December, 1929	January, 1929
Spain .....	7,700		11,388
Sweden .....	13,501	22,108	6,648
Canada .....		59	98
Cuba .....	49,000	51,000	39,000
Chile .....	187,114	186,438	83,451
French Africa .....	30,520	21,450	25,100
Other countries .....	5,000	5,000	13,105
Total .....	292,835	286,055	178,790

# U. S. Steel Reports Biggest Year

Average Operations 89.2 Per Cent, Shipping Prices Gain 38c. a Ton  
Over 1928, Finished Steel Output 15,234,355 Tons

In its pamphlet report for 1929 just issued to stockholders, the United States Steel Corporation shows total earnings for last year of \$265,838,932. Deducting interest on bonds and mortgages, charges and allowances for depreciation and obsolescence, the balance available for dividends and surplus account was \$197,592,060, which includes \$9,972,160, representing special income receipts for the year and net adjustments of various accounts. Dividends paid on preferred stock amounted to \$25,219,677 and on common stock \$63,849,040, a total of \$89,068,717, leaving \$108,523,342 of surplus net income.

The balance of undivided surplus on Dec. 31, 1929, exclusive of profits earned by subsidiary companies on intercompany sales of products on hand in inventories was \$434,711,117. Surplus of subsidiary companies amounted to \$44,898,748.

## Operations Averaged 89.2 Per Cent

During the first nine months of 1929, the corporation's operations averaged 94 per cent of full capacity of finished products for sale. Peak production of approximately 100 per cent was reached in May, and there was no appreciable recession in deliveries, the report says, until October. During the last quarter output dropped to an average of 74½ per cent. For the entire year the operating average was 89.2 per cent, as compared with 83.4 per cent in 1928.

"Following the financial disturbances in the securities market in October and November," the report says, "there was up to Jan. 1 a marked reduction in the tonnage of new business placed. But following that date there was an improvement which has continued to the date of writing this report. At Dec. 31, 1929, the unfilled orders on the books of the subsidiary companies totaled 4,417,193 tons, compared with 3,976,712 tons at close of 1928. At March 1, 1930, the total was 4,479,748 tons. During the first two months of 1930 production of finished products for sale averaged 80 per cent of capacity, while shipments were at a somewhat higher percentage on account of considerable tonnage having been shipped from stock."

## Finished Products 15,234,355 Tons

Increases in output were general in all departments of the corporation's business except cement, the demand for this product having begun to show a falling off in the latter part of 1928.

It is stated that demand this year is greatly in excess of that during the same period last year.

Aggregate output of finished steel products shipped to both domestic and foreign trade during 1929 was 15,234,355 tons, as compared with 13,973,129 tons in 1928, a gain of 1,261,226 tons. Rails, wire products, rail accessories and bolts, nuts and rivets showed declines, but all other steel products gained. Axles increased 94.2 per cent; steel carwheels, 54.5 per cent; plates, 27.6 per cent, and heavy structural steel, 23.4 per cent.

The average price received for the total tonnage of rolled and other finished products shipped in domestic trade during the year was 23c. a ton more than the average received in 1928, while on export shipments, the amount received per ton averaged \$2.22 more than in the previous year. The average increase for domestic and export shipments combined was 38c. a ton.

The total value of business transacted during the year was \$1,493,505,485, compared with \$1,374,443,433 in 1928, an increase of \$119,062,052.

Expenditures for repairs and replacements were \$106,364,769, a slight

increase over the outlay in the preceding year for similar purposes.

## Bond Reduction \$344,344,437

Under the new financial plan approved by the directors early in the year, the corporation retired \$265,455,000 of the bonds of the parent company and \$29,573,000 of the bonds of the Indiana Steel Co. and the National Tube Co. With other bonds which reached maturity or were otherwise cancelled, the total reduction of bonded indebtedness during the year was \$344,344,437.

Of the 1,016,605 new common shares authorized during the year, stockholders exercised rights for 1,009,867 shares, and the remainder were sold in the open market, netting the corporation \$142,697,624, which was applied to bond reduction.

As of the present date, the total amount of common stock outstanding is 8,560,876 shares, including 428,036 shares issued since Jan. 1, 1930, for the acquisition of the Columbia Steel Corporation of California and the Atlas Portland Cement Co. The total number of preferred shares outstanding is 3,602,811.

Capital expenditures were \$59,329,-

Table I—Production and Shipments in 1929 and 1928

Products	1929, Tons	1928, Tons	1929 Increase or Decrease (-)	
			Tons	Per Cent
Ores mined . . . . .	30,540,565	26,633,554	3,907,011	14.7
Limestone quarried (includes dolomite and fluor spar) . . . . .	14,763,412	14,600,181	163,231	1.1
Coal mined . . . . .	31,826,634	28,691,024	3,135,610	10.9
Bee-hive coke . . . . .	987,404	448,378	539,026	120.2
By-product coke . . . . .	16,367,632	15,544,995	822,637	5.3
Pig iron . . . . .	16,295,419	15,077,527	1,217,892	8.1
Splegel, ferromanganese and ferro-silicon . . . . .	189,566	160,190	29,376	18.3
Bessemer ingots . . . . .	4,225,272	3,989,400	235,872	5.9
Open-hearth ingots . . . . .	17,643,544	16,116,349	1,527,195	9.5
Rolled and finished steel products:				
Steel rails (heavy and light T and girder) . . . . .	1,362,704	1,366,324	-3,620	-1.3
Blooms, billets, slabs, sheet and tin plate bars . . . . .	1,008,477	899,309	109,168	12.1
Plates . . . . .	1,889,793	1,481,269	408,524	27.6
Heavy structural shapes . . . . .	1,326,678	1,075,045	251,633	23.4
Merchant bars, hoops, skelp, light shapes, etc. . . . .	3,156,628	2,957,518	199,110	6.7
Tubing and pipe . . . . .	1,495,940	1,431,134	64,506	4.5
Wire rods . . . . .	229,281	228,745	536	.2
Wire and wire products . . . . .	1,324,262	1,339,623	-15,361	-1.2
Sheets (black and galvanized) and tin plate . . . . .	2,093,267	1,945,551	147,716	7.6
Finished structural work . . . . .	689,664	578,782	110,882	19.2
Angle splice bars and all other rail joints . . . . .	229,867	250,401	-20,534	-8.2
Spikes, bolts, nuts and rivets . . . . .	63,722	71,765	-8,043	-11.2
Axes . . . . .	75,896	39,076	36,820	94.2
Steel car wheels . . . . .	94,137	60,937	33,200	54.5
Sundry steel and iron products . . . . .	262,353	246,609	15,744	6.4
Total . . . . .	15,302,669	13,972,388	1,330,281	9.5
Miscellaneous products:				
Zinc . . . . .	75,202	73,518	1,684	2.3
Sulphate of iron . . . . .	30,612	35,269	-4,657	-13.2
Fertilizer—basic slag . . . . .	34,334	21,186	13,148	62.1
Ammonia (in sulphate equivalent) . . . . .	243,041	244,018	-977	-4
Benzol products . . . . .	228,401	221,662	6,739	3.0
Universal Portland cement (bbl.) . . . . .	11,549,000	14,957,000	-3,408,000	-22.8

Table II—Foreign and Domestic Shipments

Domestic Shipments	1929,	1928,	Increase or Decrease	
	Tons	Tons	Tons	Per Cent
Rolled and finished steel products	14,027,128	12,700,556	1,326,572	10.44 Inc.
Pig iron, ingots, ferro and scrap	339,867	299,603	40,264	13.44 Inc.
Coal, coke, iron ore and limestone	6,217,942	4,282,412	1,935,530	45.20 Inc.
Sundry materials and by-products	169,557	161,224	8,333	5.17 Inc.
Total tons all kinds of materials, except cement	20,754,494	17,443,795	3,310,699	18.98 Inc.
Universal Portland cement (bbl.)	12,234,733	14,555,064	2,320,331	15.94 Dec.
Export Shipments	1929,	1928,	Increase or Decrease	
Rolled and finished steel products	1,207,227	1,272,573	65,346	5.13 Dec.
Pig iron, ferro and scrap	20,962	45,493	24,531	53.92 Dec.
Sundry materials and by-products	188,309	153,488	34,821	22.69 Inc.
Total tons all kinds of materials	1,416,498	1,471,554	55,056	3.74 Dec.
Aggregate tonnage of rolled and finished steel products shipped to both domestic and export trade	15,234,355	13,973,129	1,261,226	9.03 Inc.
Total value of business (covering all of above shipments, including cement, marine equipment delivered and other business not measured by the ton unit):				
Domestic (not including inter-company sales)	\$890,485,381	\$821,558,132	\$68,927,249	8.39 Inc.
Export	89,656,315	91,017,636	1,361,321	1.50 Dec.
Total	\$980,141,696	\$912,575,768	\$67,565,928	7.40 Inc.

674 for additional property, new plants, extensions and improvements. The following obsolete plants were discontinued and their investment cost written off: Bellaire, Ohio, plant, New Castle, Ohio, blast furnace No. 1 and

the old Pittsburgh warehouse, all of the Carnegie Steel Co.; the Salem, Ohio, plant of the American Steel & Wire Co.; the Lassig (Chicago) plant of the American Bridge Co.; the Bessemer, Ala., blast furnaces Nos. 1 and

Table III—Comparative Income Account for Fiscal Years Ending Dec. 31, 1929 and 1928

	1929	1928	+ Increase —Decrease
Earnings—Before charging interest on bonds and mortgages of subsidiary companies:			
First quarter	\$61,978,984.92	\$42,884,055.86	+ \$19,094,929.06
Second quarter	73,861,425.16	48,874,819.24	+ 24,986,605.92
Third quarter	72,009,666.20	54,049,214.56	+ 17,960,451.64
Fourth quarter	57,988,855.99	55,178,209.45	+ 2,810,646.54
Total for year	*\$265,838,932.27	*\$200,986,299.11	+ \$64,852,633.16
Less, interest on outstanding bonds and mortgages of the subsidiary companies	7,116,478.98	7,681,371.88	— 564,892.90
Balance of earnings	\$258,722,453.29	\$193,304,927.23	+ \$65,417,526.06
Less, charges and allowances for depletion, depreciation, amortization and obsolescence applied as follows:			
To depletion and depreciation reserves of subsidiary companies	63,274,162.66	55,621,494.96	+ 7,652,667.70
To sinking funds on U. S. Steel Corporation bonds		11,615,808.44	— 11,615,808.44
Net income in the year	\$195,448,290.63	\$126,067,623.83	+ \$69,380,666.80
Deduct:			
Interest on U. S. Steel Corporation bonds outstanding	7,828,391.36	16,106,572.90	— 8,278,181.54
Premium paid on bonds redeemed:			
On subsidiary companies' bonds		405,893.83	— 405,893.83
On U. S. Steel Corp. bonds		1,552,170.36	— 1,552,170.36
Balance	\$187,619,899.27	\$108,002,986.74	+ \$79,616,912.53
Add: Special income receipts for the year, including adjustments of various accounts	9,972,160.97	6,170,788.00	+ 3,801,372.97
	\$197,592,060.24	\$114,173,774.74	+ \$83,418,285.50
Dividends on U. S. Steel Corporation stocks:			
Preferred, 7 per cent	25,219,677.00	25,219,677.00	.....
Common—1929 regular 7 per cent, extra 1 per cent; 1928 regular 7 per cent	63,849,040.25	49,813,645.00	+ 14,035,395.25
Surplus net income	\$108,523,342.99	\$39,140,452.74	+ \$69,382,890.25

\*Balance of earnings after making allowances for estimated amount of Federal income taxes.

2 of the Tennessee Coal, Iron & Railroad Co. The Fairfield car plant of the Tennessee company was sold. At the National plant of the National Tube Co. six lapweld pipe mills were discontinued, as were two at the Lorain, Ohio, plant, this having been occasioned largely by the program decided upon late in 1928 to substitute seamless pipe capacity for a substantial part of the lapweld pipe capacity.

The average number of employees of the corporation was 224,980, a gain of 3278 over 1928. Average earnings, exclusive of general administrative and selling force, were \$5.84 a day, against \$5.85 in the year before. The total of all wages and salaries for the year was \$420,072,851. At Dec. 31, last, 50,618 employees were registered stockholders, with an aggregate ownership of 129,621 shares of preferred stock and 715,177 shares of common. There were 23,710 additional employees who had in force open subscription accounts for the purchase of stock, which had not been transferred to their names.

### Financial Reports

American Steel Foundries reports for the year ended Dec. 31, 1929, a consolidated net income of \$5,121,487, compared with \$3,266,073 in 1928. Last year's net is equal, after preferred dividends, to \$4.70 a share on 993,020 common shares, against \$3.02 in 1928, when 902,745 common shares were outstanding.

Harnischfeger Corporation, Milwaukee, reports net income for the year ended Dec. 31, 1929, of \$1,240,547, after all charges, including Federal taxes, equal, after preferred dividends, to \$3.85 a share on the 300,000 shares of no par common stock outstanding. In 1928, net income amounted to \$845,574, or \$2.81 a common share as based on the present capitalization. At the end of 1929 the company had current assets of \$8,508,648 and current liabilities of \$1,211,002, as compared with \$12,200,109 and \$1,313,258 as of July 31, 1929.

Otis Steel Co., Cleveland, reports earnings of \$3,687,690 after all charges, including estimated Federal taxes during 1929, as compared with \$3,370,982 during the previous year. The net for the year after dividends on prior preference stock was \$3.41 a share on 841,002 shares of common stock, as compared with \$3.02 on the same number of shares in 1928. During the year \$2,631,313 was expended for repairs, maintenance and renewals, all of which was charged to operations, and over \$1,000,000 was expended for capital improvements.

Foote-Burt Co., Cleveland, reports net profits during 1929 of \$407,439 or \$4.18 a share on its no par common stock. This compared with \$6.13 in 1928 and \$2.85 in 1927.

# Steel Needs Do Not Demand Higher Output

BY LEWIS H. HANEY

Director, New York University Bureau of Business Research

OUR measurements of the iron and steel industry for February give the following results: The steel ingot output was 107 per cent of normal, which compares with 92.8 in January and 115.8 a year ago. The unfilled orders of the Steel Corporation gained slightly more than usual for the season and were 97.6 per cent of the average for 1923-'27, against 97.4 in January and 90.4 a year ago. Pig iron production was 104.3 per cent of normal, against 96.9 in January and 118.5 in February, 1929. Prices sagged slightly. Finished steel in February averaged 91.4 per cent of the 1923-'27 average, against 92.1 in January and 94.7 a year ago. Pig iron prices, on the same basis of comparison, averaged 84.2, against 85 and 85.9, respectively.

## Was Production Pushed Too Hard?

While the steel ingot output in February was a little above normal and the curve of finished steel prices continued its gradual decline, the cold statistical presentation does not make a bad picture. The unfilled orders of the Steel Corporation were only a little below average and continued to show a very slight upward trend. The chart would suggest the possibility of stabilization if steel production had been kept a little lower. This is probably the chief question—was steel production stepped up too fast?

Probably it was. This is indicated by the fact that March production has apparently slipped back, at a season when activity ordinarily increases. The activity of consuming industries suggests no justifi-

cation, with railroad freight traffic declining, building at a low level, and the automobile trade distinctly backward. The market for steel scrap indicates the lack of buoyancy in the steel industry. Finally, the P-V Line declined in February (not here shown), indicating a weak supply-and-demand situation.

## Conditions No Better Than in 1924

It seems fair to reason as follows: In two months, steel production was expanded so as to bring it back close to the same annual rate that existed in the first quarter of 1928—a rate which, if it continued, would make 1930 second only to 1929 in production. It will be remembered, too, that steel production has fallen below normal during only three months. But the general business conditions are certainly no better than they were in 1924, and in some respects are worse, notably in building, car loadings, and employment. In the earlier period, steel making ran below our theoretical normal level during nine months. Even in the 1927 recession it was below normal for five months. This reasoning suggests that there has not yet been a sufficient period of "correction."

The relation existing between pig iron production and steel production in February was such that one might have expected some improvement in the pig iron market. The subsequent decline in steel making, however, together with the fact that pig iron markets have been quite "saggy," affords little hope that this expectation will be realized.



The Showing Is That Steel Production in February Might Well Have Been Kept a Little Lower, Thus to Hasten Stabilization

# This Issue in Brief

Employees' mutual aid society provides medical attention and sick benefits at low cost. Although membership in Allis-Chalmers' society organization is not compulsory, more than 99 per cent of employees are members. Dues are \$6 a year. Company contributes an equal amount per member.—Page 843.

\* \* \*

Brittleness in chromium and nickel-chromium steels can be cured by cooling rapidly from the tempering treatment by quenching. If the steel contains molybdenum, temper-brittleness will be eliminated.—Page 852.

\* \* \*

When you buy large steel forgings containing nickel, see that they are heat treated before delivery. The treatments used are the three standard ones of annealing, normalizing and quenching and tempering.—Page 852.

\* \* \*

Engineering obsolescence is a serious factor in the aircraft industry, and hinders the trend toward all-metal construction. Production machinery, special jigs and dies are expensive and the airplane market is as yet small.—Page 858.

\* \* \*

New field in metallurgy is opened up by the method of producing tungsten carbide, i.e., sintering, without fusion, says metallurgist. Melting, forging and heat treatment are not necessary.—Page 863.

\* \* \*

No necks on these new hot-strip mill rolls. The rolls are true cylinders. Roller bearings back up the rolls on the extension of the rolling surface, giving ample bearing area and ruggedness of construction.—Page 846.

Avoid installation of most modern or most specialized production machinery, aircraft builder tells aircraft industry. Present volume of business will not warrant expenditures, he says. Automobile mass production methods are not probable for several years. Costs can be cut by developing simpler designs.—Page 858.

\* \* \*

Sponge iron not directly competitive with scrap on a price basis, says engineer. He sees a growing market for sponge iron in the manufacture of high-grade steels, owing to the growing difficulty of getting scrap free from undesirable alloys.—Page 850.

\* \* \*

When molds are too heavy to be closed easily by one man, an eastern jobbing foundry runs a row of copies on one conveyor line and a row of drags on an adjacent parallel line. After about ten sets have been made, the cores are set, and two molders, working together with an air hoist, close the cope over the drag.—Page 854.

\* \* \*

Pouring of molds on gravity conveyors causes little damage to rollers. Not over 20 or 30 rollers have had to be replaced, due to spilled metal, in eastern jobbing foundry. Nor has there been any breakage of mold, caused by banging together on the conveyor.—Page 857.

\* \* \*

Industrial countries will soon recover from business setback, says economist. Money became easier in these countries as soon as the great security boom collapsed. But in regions where money is tightening, the difficulties are deepseated, he says, and there is no prospect of an early recovery. These are largely the raw material producing sections.—Page 865.

Should it be cast or welded? Compare the costs and set down the advantages and disadvantages of each method for the specific application in mind, says welding equipment builder. He declares a saving of 37 per cent was realized by welding a pump base.—Page 861.

\* \* \*

Rake and clearance angles of a cutting tool are of very great importance, says metallurgist, especially in the application of tungsten carbide. He advocates a front clearance of 6 deg. in cutting cast iron, and 4 deg. for hard steel.—Page 863.

\* \* \*

Tungsten carbide has a hardness value in excess of 1500 Brinell, which is considerably more than double that of the hardest steel. The average surface hardness of nitrided steel is estimated at about 1000 Brinell.—Page 864.

\* \* \*

Export sales will be curtailed by shrinkage in purchasing power of many countries, says Dr. Hardy. Decline in raw material prices will necessitate readjustment in the raw material producing countries.—Page 866.

\* \* \*

Either coils or straight lengths can be produced on new hot strip mill. If straight strips are wanted, the section of run-out table is put in place of vibrator and auxiliary mechanism.—Page 846.

\* \* \*

Does pressing produce a better alloy forging than hammering? The quality of the end product is the real test, says metallurgist. Some hold that the rolled bloom is superior to the forged bloom. Blooms of alloy steel to be re-forged should be allowed to cool extremely slowly to avoid internal ruptures.—Page 851.

Timken Roller Bearing Co., Canton, Ohio, reports net profits of \$14,155,114 in 1929, after deductions of \$2,560,000 for income taxes and depreciation. This is equal to \$5.87 a share on 2,407,824 shares. In 1928 the company earned \$13,730,145, or \$11.43 a share on 1,200,882 shares. Expenditures for new construction in 1929 were \$7,740,000. After dividends, \$6,942,823 was transferred to surplus, which amounted to \$40,457,721 on Jan. 1. The company states that sales of bearings to automobile manufacturers increased considerably during the year, exports to European motor car companies increased 25 per cent and business in the general machinery field gained more than 35 per cent. Progress in the railroad field was stressed. One of the company's experiments in this field was the equipping of a locomotive with 63,000 lb. tractive effort with Timken bearings. This locomotive will be placed in service shortly. The company also arranged with the Pennsylvania Railroad to test a railroad train of 100-70-ton cars equipped with Timken bearings. Experiments are in progress to determine the savings made in power and the possibilities of increased railroad speed through the use of Timken bearings.

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Marion Steam Shovel Co., Marion, Ohio, reports net profits for 1929 after deducting all charges for interest, taxes, depreciation and obsolescence of \$534,185, as compared with \$373,867 in 1928. After preferred dividends this is equivalent to \$3.17 a share on common stock, as compared with \$1.57 for 1928.

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Lamson & Sessions Co., Cleveland, reports net profits of \$1,260,218 during 1929, these including the profits of the Lake Erie Bolt & Nut Co., American Bolt Co. and Foster Bolt & Nut Co., which were recently merged with the Lamson & Sessions Co. Profits, after preferred dividends, were equal to \$4.31 a share on 277,862 shares of common stock.

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Sharon Steel Hoop Co., Sharon, Pa., reports net profits of \$1,341,215 for 1929. Dividends totaled \$557,489, of which \$19,729 was paid on preferred stock, which has been retired. Earnings were equal to \$2.60 a share on 500,000 shares no par common stock, after providing for preferred dividend.

—

Annual report of Youngstown Sheet & Tube Co. and subsidiary companies for 1929 shows a gross income of \$34,024,104 and a net profit of \$21,564,174. Dividends totaled \$6,325,000. For plant improvements and new construction during the year \$22,900,000 was expended. The program was financed from earnings.

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Midvale Co., Philadelphia, reports a net profit of \$1,368,033 for 1929. Dividends on 200,000 shares of no par value stock totaled \$650,000, or \$3.25 a share.

## Bethlehem Benefits from Modernization

### Annual Report Cites Gains Due to Expenditures of \$157,000,000 in Rebuilding Program Carried On Since 1923

THE Bethlehem Steel Corporation's twenty-fifth annual report mailed to stockholders last week discloses the benefits which Bethlehem has received from its extensive modernization program on which it has been engaged since 1923 at a cost of over \$157,000,000.

Net income for 1929 was considerably more than twice that of 1928. After providing \$11,217,180 for interest charges and \$14,009,085 for depreciation and depletion, the net income for 1929 totaled \$42,242,980, as compared with \$18,585,922 for the preceding year.

#### Gross Sales \$342,516,207

Gross sales for the year totaled \$342,516,207, compared with \$294,778,287 in 1928. During 1929 the company booked orders aggregating \$369,536,888, compared with \$295,209,483 during 1928. Unfilled orders on Dec. 31, 1929, amounted to \$86,060,883, compared with \$59,040,202 on Dec. 31, 1928.

Earnings after preferred dividends were equivalent to \$19.58 a share on the 1,800,000 shares of common stock outstanding at the beginning of the year and \$15.50 a share on the average number of shares of common stock outstanding during the year.

The report points out that during the year approximately \$136,000,000 was raised by issues of common stock to be applied in reduction of funded debt and in financing new capital outlays. The corporation's common stock was changed into shares without par value and the authorized common stock increased to 5,000,000 shares without par value; 600,000 shares of new common stock were offered for subscription by the stockholders on or before June 18, 1929, and an additional 800,000 shares for subscription on or before Oct. 21, 1929. The proceeds of these two offerings, being received late in the year, contributed very little to the year's earnings.

#### To Reduce Bonded Debt Further

The principal reduction in debt occurred on Feb. 1, 1930, when all the consolidated mortgage bonds of the corporation were redeemed. Between Dec. 31, 1928, and Feb. 1, 1930, Bethlehem paid or retired by purchase or redemption \$83,869,977 of its funded debt out of \$199,421,172 outstanding at the end of 1928. The report states that the funded debt will be further reduced during the current year through the application of the remainder of the money provided for that purpose by the sale of common stock in October, 1929. These increases in Bethlehem's capital stock and the reductions in its funded debt have improved its capital structure. Its funded debt will represent less than 20 per cent of the total investment

in its business, aggregating nearly \$700,000,000, as represented by capital stock, bonds, surplus and reserves.

The consolidated balance sheet as of Dec. 31, 1929, shows current assets of \$228,171,775, as against current liabilities of \$48,926,119, or a ratio of 4.6 to 1. Current assets include \$69,147,204 in inventories and \$117,546,496 in cash and marketable securities (chiefly United States Government securities). These are exclusive of the \$78,472,582 held for the redemption of bonds, but not yet applied at Dec. 31, 1929.

Cash expenditures for additions and improvements to properties during the year amounted to \$22,193,308 and the estimated cost of building construction authorized and in progress at the end of 1929 is \$52,600,000.

#### Operations Averaged 91.8 Per Cent

Bethlehem Steel Corporation operated during 1929 at the average of 91.8 per cent of capacity as compared with 82 per cent in 1928 and 73.6 per cent in 1927. In this connection the report states:

"The rated steel capacity of Bethlehem was increased to 8,230,000 tons per annum and its pig iron capacity to 7,200,000 tons per annum effective in both cases on Jan. 1, 1930. Both increases resulted from improvements and more modern designs incorporated in furnaces which have been rebuilt. The purchase of the Pacific Coast plant has since increased the steel capacity to 8,610,000 tons and the two open-hearth departments now under construction will result in a further increase of 1,200,000 tons."

The report refers to the recent adoption by the board of directors of a "management stock ownership plan" designed to encourage and facilitate the purchase of common stock by officers and employees occupying important positions in the management of the corporation and its subsidiary companies. In the furtherance of this plan the corporation has purchased in the open market a substantial amount of its common stock which has been offered to such officers and employees at a price per share equal to the net cost to the corporation payable by monthly deductions from earnings over a term of years.

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Allegheny Steel Co., Brackenridge, Pa., had net earnings in 1929 of \$3,311,493 after depreciation and Federal taxes, equivalent, after preferred dividends, to \$5.04 a share on the 610,026 shares outstanding at the end of the year. This compares with \$2,193,235 earned in 1928, which was equal to \$3.66 a share on the common stock outstanding at that time. Total surplus as of Dec. 31, 1929, stood at \$15,204,039.

# Consolidation Depends on Proxy Battle

## Proposed Purchase of Youngstown Sheet & Tube Co. by Bethlehem Steel Corporation Requires Approval of Stockholders

**A**BATTLE for proxies is the sequel of concurrent action March 12 by the boards of directors of the Bethlehem Steel Corporation and the Youngstown Sheet & Tube Co., authorizing the purchase of the latter by the Bethlehem company or one or more of its subsidiaries.

Opposition to the sale is being led by Cyrus S. Eaton, Cleveland financier, who has temporarily established headquarters at Youngstown. Allied with him is the Wick group of Youngstown, one of the pioneer families in developing the Mahoning Valley steel industry. The proxy committee opposing the plan includes Philip Schaff, connected with Wick & Co., investment brokers, Youngstown; W. H. Foster, chairman, General Fireproofing Co., Youngstown; Hugh B. Wick, Cleveland, formerly president of Steel & Tubes, Inc., of Elyria, Ohio, taken over by the Republic Iron & Steel Co., and Myron C. Wick, Youngstown, representing the Wick estate. Julius Kahn, president, Truscon Steel Co., Youngstown, was originally appointed a member of the proxy committee opposing the sale, but withdrew the same day he was named, stating that his position was a neutral one.

### Stockholders' Meeting April 8

The proposed sale will be submitted to common stockholders of the Youngstown company at a special meeting on April 8. There are 1,200,000 shares of common stock outstanding, and under Ohio law it is necessary to obtain the consent of holders of two-thirds of these shares, or 800,000, to carry out the recommendation of directors. There are 4500 shareholders.

Mr. Eaton states that he has assurances from holders of more than the required number of shares to block the plan.

The agreement of the directors contemplates the assumption by the Bethlehem company of the outstanding bonds and all other liabilities and obligations of the Youngstown organization, payment in cash of an amount equal to the par value (\$15,000,000) of the preferred shares of the Youngstown company and accrued dividends thereon to the date of liquidation, and the ex-

change of 1,200,000 shares of Youngstown common stock for 1,600,000 common shares of the Bethlehem corporation. In other words, 1 1-3 shares of Bethlehem stock will be exchanged for one share of common stock in the Youngstown company. The selling company will retire its outstanding shares of preferred stock as part of the transaction.

### Objections to the Sale

A letter sent out by the committee opposed to the consolidation declares that the "announced basis of 1 1-3 shares of common stock of Bethlehem for one share of Youngstown common stock involves a substantial sacrifice to Youngstown Sheet & Tube stockholders on the basis of the current market." It is also declared that the sale would be "hurtful to the local community and demoralizing to the steel industry." The committee adds that "it would deeply regret to see a company whose destiny has been so closely bound up with that of Ohio and the Youngstown district absorbed by Eastern interests and disappear from history."

The Youngstown Sheet & Tube Co. management, headed by James A.

Campbell, chairman, and Frank Purnell, president, has appointed the following proxy committee to secure stockholders' support for the sale: James A. Campbell, John Tod, Richard Garlick and Samuel Mather.

For the first time in years the Sheet & Tube company board of directors is divided on the recommendation of Mr. Campbell. A poll of the board showed that six favored the sale to Bethlehem and three opposed it.

Mr. Campbell and Mr. Purnell have both issued statements explaining their viewpoints, and declare the plan as proposed, in view of increasing competition in the steel industry, will be for the best interests of the company and of Youngstown. They state that the decision to sell came only after five years of serious consideration of the problem. In view of the opposition they have obtained the consent of Eugene G. Grace, president of the Bethlehem Steel Corporation, to come to Youngstown and address various groups on the benefits of the proposed arrangement. Under the plan, Youngstown would become the Western headquarters of Bethlehem, with an executive and administrative group stationed there. Mr. Campbell, it is stated, would remain with the corporation in an executive capacity.

### Two Companies Would Be Complementary

In statements given to the press March 12, both Mr. Grace and Mr. Campbell emphasized the fact that the two companies would admirably supplement each other. On this point Mr. Grace said:

"Bethlehem's principal steel products are structural shapes, rails and rail accessories (which Youngstown does not produce) and plates and bars for the production of which Youngstown has only a small percentage of the capacity of the country. On the other hand, Youngstown manufactures principally the more highly finished steel products, especially tubular products and sheets, while Bethlehem's capacity for such products is only a small percentage of that of the country and its plants for the production thereof (except boiler tubes, which Youngstown does not pro-



DISTRIBUTION of the Plants of the Bethlehem Steel Corporation and the Youngstown Sheet & Tube Co., Excluding Bethlehem Properties on the Pacific Coast. On the map, B stands for Bethlehem and Y for Youngstown



James A. Campbell

duce) are located at Sparrows Point, Md. The consolidation should, therefore, result in a better diversification of products and consequently more stabilized earnings."

Addressing himself to the same subject, Mr. Campbell said:

"Bethlehem produces all of the important commercial steel products which this company either does not produce at all or for the production of which it has only a small capacity."

#### Ratio of Light to Heavy Products

In informal remarks to the press, Mr. Grace stated that only 31 per cent of Youngstown's production is in heavy rolled products, compared with 69 per cent in light products. The ratio for Bethlehem, on the other hand, is 78 per cent for heavy products against 22 per cent for light products. The combined company would produce 66 per cent heavy products and 34 per cent light products.

In recommending the consolidation, Mr. Campbell said that it would result in the substantial competitive advantage of being able to supply customers with their entire requirements in all steel products. By the same token it would tend to eliminate fluctuations in earnings due to a lack of diversification of products. He likewise pointed out Bethlehem's strong position in export markets, with the Sparrows Point plant located at tidewater and with a fleet of ocean-going vessels operating between Atlantic, Gulf and Pacific ports.

#### Combined Capacity 13,000,000 Tons

The acquisition of the Youngstown Sheet & Tube Co., if approved, will give the Bethlehem Steel Corporation steel capacity in or near every important producing center in the country outside of the South. Its recent purchase of the Pacific Coast Steel Co., provides it with plants at three points on the Western coast. The map shows the distribution of blast furnaces, steel works and mills with the exception of the Pacific Coast plants.

The combined steel ingot capacity of the Youngstown and Bethlehem

companies, according to a statement by Mr. Grace to the press, would be 13,000,000 gross tons a year, counting open-hearth capacity now under construction by Bethlehem. This, he said, would be about 20 per cent of total capacity of the country, which he placed at 65,000,000 to 66,000,000 tons. Bethlehem's capacity, after the completion of work now under way, will be 10,000,000 tons a year, while Youngstown's capacity is 3,000,000 tons.

Bethlehem's capacity alone will exceed the best production of Great Britain or France and will surpass the output of the United States Steel Corporation in each of the first four years of its existence.

The Bethlehem-Youngstown combination would have a little more than one-half of the present rated capacity of the Steel Corporation, which, at 24,500,000 tons, represents 38 per cent of the total capacity of the country. Incidentally the Steel Corporation's

In spite of the impressive integration of plants into one corporate unit in 1901, independent companies continued to grow and prosper. The Youngstown Sheet & Tube Co., now the fourth largest steel producer in the country, was started in a small way in November, 1900. The original Bethlehem plant was one of the earliest iron and steel works in the United States, but for many years it was engaged chiefly in the making of guns, shells and armor plate. The existing Bethlehem Steel Corporation was incorporated in December, 1904, and early in 1905 acquired the Bethlehem plant, which then had a steel-making capacity of only 190,000 tons a year. The Bethlehem plant was expanded and remodeled into a commercial steel plant and other companies were acquired, the most important of which were the Pennsylvania Steel Co. with a plant at Steelton, Pa., and the Maryland plant at Sparrows Point, Md.; the Lackawanna Steel Co., with a plant at Buffalo; and the Midvale Steel & Ordnance Co., with Cambria plant at Johnstown, Pa., and the Worth plant, Coatesville, Pa.



Eugene G. Grace

proportion of total production has declined steadily since its formation, having been highest in 1901 at 67.3 per cent.

So conservative a journal as *Engineer*, London, said in 1901 by way of comment on the Steel Corporation, "Mr. Morgan will not rest content until he holds every iron mine and every blast furnace in the United States. . . . As matters stand, Mr. Morgan and his immediate partners can fix the price of iron and steel. . . . The American consumer is absolutely in the hands of the trust."

THE IRON AGE report of Feb. 14, 1901, announcing the formation of the Steel Corporation, carried the following heading: "The Great Consolidation—Practically the Whole of the Steel Trade of the Central West Under One Control." In the body of the article it was stated that "in the Central West the only really large makers of billets independent of the consolidation will be Jones & Laughlin, Ltd., of Pittsburgh."

#### Taylor Society Meeting

Henry P. Kendall, president and treasurer, Kendall Co., Boston, and president of the Taylor Society, will address the Metropolitan section of that association at a dinner meeting March 20. The meeting will convene at 6.15 p.m. at the Fraternity Clubs, 22 East Thirty-eighth Street, New York. Mr. Kendall's subject will be "Policy, Plant and Personnel." His remarks will be discussed by E. G. Coburn, member of the firm of Sander-son & Porter, engineers, New York, and by Henry C. Metcalf, Bureau of Personnel Administration, New York.

Bethlehem Steel Co. has ordered from the Freyn Engineering Co. five Mathesius hot blast valves to be used at Johnstown, Pa.



C. S. Eaton

## Public Works Bills to Be Expedited

WASHINGTON, March 18.—Senator Watson, Indiana, majority leader, and Senator McNary, Republican, Oregon, called at the White House on Thursday of last week and discussed legislative matters with President Hoover, especially plans for speeding bills covering public construction work. Following the conference, Senator Watson said he believes that the emergency public building and Federal road aid measures can be enacted quickly as a part of the employment program. These and other bills have been delayed by the Senate discussion on the tariff, which, according to Senator Watson, will be disposed of probably some time during the current week. The Muscle Shoals bill is to be given right of way after the tariff is passed by the Senate, but leaders expressed the view that public works bills can also be handled soon.

The Dowell bill, increasing the appropriations for roads to \$125,000,000 from \$75,000,000, is in conference, while the Elliott public buildings bill, carrying \$230,000,000, is on the Senate calendar.

## Monel Metal Is Used in Cleveland Terminal

More than 30 tons of Monel metal sheets was used in the construction of the new Union Station in Cleveland. The material is used in an unusual way, being entirely concealed in the floor slabs and street paving throughout the entire station area.

The station portion of the building is entirely below the street level; the shape is that of a large triangle 2000 ft. long at the base. At the grade level it is crossed by two longitudinal and three intersecting streets, all of which are public thoroughfares.

Because of its great size, the structure is composed of separate units linked together with sliding joints to

afford movement caused by expansion and contraction. This feature was given thorough study to provide construction of expansion joints that would be efficient and permanent. As these joints are inaccessible, some being buried under tons of concrete, cork insulation, waterproofing materials and street paving, the metal selected had to be of lasting quality, strong, and yet sufficiently flexible to move with the main structure.

Monel metal was selected because of its corrosion and fatigue resistance, and because its strength and coefficient of linear expansion are close to that of structural steel.

The total length of the Monel metal joints used is approximately 16,000 ft., the size and shape varying to suit conditions. Most of the metal is No. 24 gage full-finished sheets, but some Nos. 12 and 16 gage sheets were used.

## Accidents at Metallurgical Works

Accidents at metallurgical works in the United States, year by year, for the 16 years ended in 1928, are detailed in Technical paper No. 474 of the United States Bureau of Mines. The number of accidents and the rate compared with exposure are given close analysis. The number of fatal accidents in 1928 was 44. No smaller number within 10 years has been recorded except the 27 in 1921. There were 54 in 1927.

Non-fatal injuries at 4654 for the year were the smallest of the decade, again with the exception of the 4494 in 1921. Slackened operation in that year was responsible for its low figure, for the rate of injury was greater than for 1928.

Figures are shown separately for ore dressing plants, smelting plants and auxiliary works. They are further subdivided by States, and the different types of accidents are classified by causes. The pamphlet may be obtained for 10c. from the Superintendent of Documents, Washington.

## Further Changes Made in Metal Schedule

WASHINGTON, March 18.—The Senate last week made a few changes in rates on items in the metal schedule of the tariff bill, a measure which majority leader Watson said will probably be sent to conference this week. It adopted an amendment offered by Senator Copeland, Democrat, New York, reducing the rate on reaction chamber to 25 per cent. The "Committee of the Whole" had approved the 50 per cent duty reported by the Finance Committee. The House bill duty is 40 per cent.

The duty of 2c. a pound was restored to antimony. This is the existing rate, and it was continued by the House, but the finance committee put in stepped rates, which were approved by the Committee of the Whole.

Senator Grundy, Republican, Pennsylvania, offered an amendment proposing a duty of \$1.40 per ton on pig iron. It was defeated. The Senate bill carries a duty of 75c., while the House bill rate is \$1.125. The duty of 75c. a ton, adopted by the Committee of the Whole for sponge iron, was affirmed by the Senate. The House bill duty is 0.3c. a pound.

Senator Glenn, Republican, Illinois, made an unsuccessful effort to restore the Senate finance committee additional duty of 1.3c. on hollow drill steel, valued at 4c. a pound or more, but the Senate upheld the Committee of the Whole, which removed this duty, leaving a base rate of 1.7c. a pound, which the House bill also carries.

The Senate retained the rates on crude aluminum and rolled aluminum on the Underwood-Simmons basis of 2c. and 3.5c. a pound respectively, which were adopted by the Committee of the Whole, while the finance committee continued the House rates, which are the same as the present rates, 5c. on crude and 9c. on rolled products.

The Senate bill carries 1c. a pound on the manganese content of ore containing 10 per cent manganese and over, while the House bill continues the present rate of 1c. on 30 per cent manganese and over.

### British Foreign Trade in Iron and Steel Products

(Gross Tons)

	Imports		Exports	
	January	February	January	February
Pig iron and ferroalloys.....	25,094	24,252	40,445	26,865
Ingots, blooms, billets and slabs....	131,816	94,419	1,364	1,366
Iron bars, rods, angles.....	17,740	14,911	1,580	1,725
Steel bars, rods, angles.....	52,313	46,641	25,297	20,789
Structural steel.....	14,295	9,483	9,006	5,398
Hoops and strips.....	16,689	18,830	3,679	3,825
Plates and sheets.....	19,125	15,816	45,429	35,570
Galvanized sheets .....	.....	.....	46,772	43,216
Tin plate .....	.....	.....	49,709	46,166
Cast tubes, pipes and fittings.....	2,255	2,889	11,887	10,805
Wrought tubes, pipes and fittings.....	5,379	6,453	25,264	22,449
Rails .....	1,035	1,346	29,503	24,643
Other railroad material.....	520	590	13,994	12,044
Wire .....	5,690	5,848	6,527	6,261
Wire cable and rope .....	.....	.....	1,737	1,836
Wire nails, including staples.....	5,606	5,426	214	301
Other wire manufactures.....	911	989	1,213	862
Nails, tacks, rivets and washers.....	1,855	973	1,324	1,072
Bolts and nuts, including screws for metal .....	1,088	914	3,516	2,315
Iron and steel castings.....	1,864	1,669	615	483
Iron and steel forgings.....	530	831	244	249
All other .....	6,511	7,116	32,327	26,047
Total .....	310,316	259,396	351,846	294,287

The Lake Erie Engineering Corporation, Buffalo, N. Y., announces the opening of its foundry division to produce gray iron, semi-steel or ferroalloy castings in the rough or finish machined. The foundry has been laid out along the lines of latest development and progress in the foundry industry. The range of capacity covers castings of 1 lb. to 60 tons in weight. The company maintains consulting, engineering and metallurgical departments, and owns to a foundry experience in its personnel of some 25 years, devoted until the present time to production of castings for its own use.

## New England Foundrymen Hear Oliver Smalley

At an unusually large meeting of the New England Foundrymen's Association at the Engineers' Club in Boston, Wednesday evening, March 12, Oliver Smalley, consulting steel and foundry metallurgist, Brooklyn, discussed foundry and cupola practice, the effect of alloys and other foundry subjects. Some of his points were illustrated with lantern slides.

Phases of expansion in the solidification of irons was one of the subjects discussed, together with the effect of alloys. He contended that too much emphasis has been placed on chemical analysis as a factor in determining mixtures for cupolas. Other influences, such as fluxes, methods of pouring, condition and nature of cores, are factors which determine the character of castings.

In the early part of his address, Mr. Smalley, starting with the preparation of the bed of the cupola, urged uniform heats, high beds, and slow hot pouring, to handle special irons, such as highest products. He advocated burning the coke in the smallest possible space, and advised close attention to the slags. Only by watching the slag can the proper gradation of flux be attained. The amount of scrap used is an important factor. As to temperatures, the speaker recommended an immersion pyrometer for the most accurate checks and referred to faults in optical pyrometers, but he did not condemn the latter for limited purposes.

## Briggs Mfg. Co. to Enter General Stamping Field

The Briggs Mfg. Co., Detroit, manufacturer of automobile bodies, has announced its entry into the general stamping field. This department of the company will be under the supervision of S. J. Menzel, formerly of the Mullins Body Corporation, Salem, Ohio, where he was manager of sales.

## Wheeling Steel Develops New Black Plate Process

The Wheeling Steel Corporation, Wheeling, W. Va., had net profits in 1929 of \$8,005,664, compared with \$6,443,739 in 1928. After payment of dividends on common and preferred stock, \$3,442,918 was carried to surplus in 1929, leaving surplus as of Dec. 31 at \$16,980,466. Total sales in 1929 amounted to \$84,687,303, as against \$78,073,001 in the preceding year. Production of steel ingots amounted to 1,331,894 tons last year and 1,287,464 tons in 1928, while pig iron output in the two years was 894,435 and 839,026 tons, respectively.

In a discussion of the year's activities the report says: "For the past two years experiments have been carried on at the Yorkville, Ohio, plant with the object of developing an improved process for producing black

plate for tinning and kindred purposes. These efforts have proved successful to the point of justifying an application for letters patent covering the process. Based upon the success of this experiment, your management has placed contracts for the erection at Steubenville, Ohio, of a unit for cold-rolling sheets and strips utilizing for the purpose the product of the new 60-in. continuous mill placed in operation during the year. This unit is now under construction and is expected to be in operation by June 1."

## Equipment for Aluminum Alloy Castings

The Quality Aluminum Casting Co., Waukesha, Wis., announces the completion of its heat-treating equipment.

The equipment consists of a General Electric furnace of the latest type and large enough to treat 1500 lb. of aluminum castings in one heat. Recording instruments are by Leeds & Northrup. This latest improvement, together with a large addition to its foundry completed last fall, puts this company in a position to serve the needs of the aviation industry, as well as others who require high-strength aluminum alloy castings.

## February British Steel and Iron Output

Pig iron production in February was 597,000 gross tons, while that of steel ingots and castings was 776,400 tons. The pig iron output was less than in January and less than the 1929 monthly average. In steel, the production last month was larger than in January, but smaller than the 1929 monthly average.

Comparison of the February output with other periods is given in the following table:

	Pig Iron, Gross Tons	Steel Ingots and Castings, Gross Tons
1913—Av.	monthly.. 855,000	638,600
1920—Av.	monthly.. 669,500	755,600
1922—Av.	monthly.. 408,500	490,100
1923—Av.	monthly.. 620,000	706,800
1924—Av.	monthly.. 609,900	685,100
1925—Av.	monthly.. 519,700	616,400
1926—Av.	monthly.. 203,500	296,700
1927—Av.	monthly.. 607,800	758,200
1928—Av.	monthly.. 550,900	710,400
1929—Av.	monthly.. 621,600	800,600
1930—January	.... 650,000	771,100
1930—February	.... 597,000	776,400

## Cement Output Falls While Shipments Increase

Production of Portland cement in February, as reported by the United States Bureau of Mines, was 8,162,000 bbl., the lowest total for any month since February, 1927, when 7,377,000 bbl. was made. January output was 8,498,000 bbl., while that for February, 1929, was 8,522,000 bbl.

Shipments in February were 7,012,000 bbl., the highest total since last November. January shipments were 4,955,000 bbl., the lowest for any month in more than five years. Those for February, 1929, were 5,448,000 bbl.

## Large Aluminum Melting Unit at Cleveland

An additional furnace for the production of "Tenual" aluminum, made by the patented process of the National Bronze & Aluminum Foundry Co., Cleveland, has recently been installed. It is an addition to the unit which the company has been operating for two years. The new furnace is the largest single unit in existence for the production of aluminum, according to the claims of the company, and has a daily capacity of 150,000 lb. It weighs over 175 tons and it required seven months to build. Its operation is entirely mechanical, the raw material being charged at one end and the finished product being delivered at the other.

Standard alloys of aluminum, highly refined and purified, are produced by this furnace. The company states that the product is remarkably uniform in maximum physical properties and that it is easy to work, due to this uniformity and to freedom from dissolved gases, hard spots and other inclusions.

## Steel Barrel Company Broadens Its Line

The Erie Steel Barrel Co., Erie, Pa., has added a full removable head drum to its general line of oil and grease barrels and drums. The company is also making an improved steel container (patents pending) which has the entire center section expanded, by a series of corrugations, to a greater diameter than the body of the drum. This, it is said, provides a 2½ gal. increase in capacity, greater strength and more capacity per cubic foot of steamer space on export shipments.

For printing designs on covers, complete decorating equipment has been added to the barrel factory.

## To Survey Outlook for Building Work

A meeting of the National Building Survey Conference is to be held in Chicago at the Blackstone Hotel at 10 a.m., March 27. This meeting, as a part of the program requested by President Hoover, will concern itself primarily with the adoption of additional efforts to be made within the next two months in the interest of the building industry.

There will be a discussion of the operation of real estate finance organizations, such as building and loan associations, insurance companies, and of savings bank mortgages, etc. Fenton B. Turck, chairman, says the committee has been successful in drawing a composite picture of what might be expected under present conditions. He adds that "there is no intention of raising any funds or in any way making this a promotional affair of any character."

H. S. Sackett, Room 804 Builders Building, 228 North La Salle Street, Chicago, may be addressed for further information.

## New York Steel Treaters Plan Annual Smoker

An event, looked forward to with eagerness by all steel treaters in New York and vicinity, is the smoker of the New York Chapter. This will be held at the McAlpin Hotel, Monday evening, March 31; it will be preceded by a dinner. Tickets for the dinner and smoker are \$4 and reservations have to be made with T. N. Holden, secretary-treasurer, E. W. Bliss Co., Brooklyn.

A number of expensive prizes and valuable souvenirs have been donated by various companies for distribution that evening. A miscellaneous program of entertainment has been provided. Indications are that steel treaters from as far away as Hartford, Conn., and Philadelphia will attend. The arrangements are in the hands of J. J. Crowe, Air Reduction Co., New York.

Dr. Zay Jeffries, Cleveland, will be the speaker at the April meeting of the New York Chapter. The subject and the date will be announced later.

## Gulf States Steel Co. Proxy Fight Settled

Paving the way for a possible merger of the Gulf States Steel Co. with the new Republic Steel Corporation, W. H. Coverdale, president of the former company, has announced that an agreement has been reached with the proxy committee which was opposed to the changing of the by-laws of the Gulf States company, whereby Otis & Co. of Cleveland and allied interests will be represented on the Gulf States board.

F. Eberstadt of Otis & Co., G. Munro Hubbard of J. G. White & Co., and Frank Altschul of Lazard Freres, representing the new interests, have been elected directors.

## White Metals Institute to Become Permanent

The Institute of White Metals, which was formed at New York last month by leading smelters and refiners and manufacturers of white metals, with temporary officers, held a meeting at the Pennsylvania Hotel on Tuesday evening, March 18, at 8 p. m., to elect permanent officers and a board of directors. The temporary officers of the institute have found a definite and growing sentiment in the various branches of the trade that the work planned by the institute should be started as soon as possible.

A meeting held in Chicago on March 7 indicated that leading white metal manufacturers in that territory subscribed to this opinion. At this meeting it was tentatively decided to restrict, for the time being, membership to three groups: Smelters and manufacturers of antimonial lead, manufacturers of solder, and manu-

facturers of Babbitt and type metals.

The temporary officers who have been at the head of the institute are: Chairman, L. Muscat, United Metals Corporation, Brooklyn; secretary, Walter Schoenbach, American Lead Co., Indianapolis, Ind.; and treasurer, Jerry Katz, of the American Metal Co., of New York.

## Coke Plant Additions for Two Steel Companies

The Koppers Construction Co. has recently contracted with the Weirton Steel Co. for the construction of an addition to the Weirton by-product plant at Weirton to include 25 Becker type ovens for blast furnace gas underfiring. This will give the Weirton company 311 ovens with an annual coal carbonizing capacity of more than 1,000,000 tons. The Colorado Fuel & Iron Co., Pueblo, Colo., has given the Koppers Construction Co. a contract for the installation of 31 Becker type combination ovens with an annual carbonizing capacity of 275,000 tons of coal. Auxiliaries will include extension of by-product and benzol plants. Work has been begun on the installation of 148 Becker type combination coke and gas ovens for the New England Fuel & Transportation Co. at Everett, Mass. These ovens will have annual coal carbonizing capacity of 1,150,000 tons.

New York offices of the Koppers Co., the Koppers Construction Co., the Koppers Erecting Corporation, the American Tar Products Co., Inc., the American Tar Products Co. of New England, and the Western Gas Construction Co. are now located in the new Lincoln Building, 60 East Forty-second Street.

## New Bar Mill Operating at Indiana Harbor

At its Indiana Harbor works, the Youngstown Sheet & Tube Co. last week started its new 10-in. combination bar mill in commercial operation, following experimental tryouts for several weeks. The 16-18-in. combination mill, under construction at Indiana Harbor, will be completed by the end of the month, while considerable progress is reported on the new 250-ton open-hearth furnaces which are being built.

## National Metal Trades to Meet April 16-17

The National Metal Trades Association has announced that its thirty-second annual convention will be held at the Hotel Astor, New York, April 16 and 17. Among the speakers will be L. F. Loree, president, Delaware & Hudson Railroad; Samuel A. Lewisohn, vice-president and treasurer, Miami Copper Co., and chairman of the board of the American Management Association, and E. K. Hall, vice-president of the American Telephone & Telegraph Co. They will present the problems of their industries and the steps they are taking to meet these basic economic problems. At the banquet Wednesday evening, April 16, Floyd Gibbons, famous war correspondent, will be the principal speaker. Commander Edward Elsberg will present at the convention luncheon an account of the struggle to raise the ill-fated submarine S-51 to the ocean surface.

The Thursday meeting will be held jointly with the National Industrial Conference Board. A chief topic of discussion at the convention will be stabilization of employment and the leveling of production. A program for attacking unemployment and over-production at the source is being planned.

## Data on World Steel Available

"Statistics of the Iron and Steel Industries" has just been issued by the National Federation of Iron and Steel Manufacturers, Caxton House, Tothill Street, Westminster, S.W.1, London, England, which contains complete data on production, output and foreign trade in pig iron and steel of practically all the producing countries of the world. It can be obtained for 5s. 5d. postage free.

Division of Simplified Practice of the Bureau of Standards has announced a conference on the simplification of arbor hole sizes for portable saws and grinders. Manufacturers are invited to attend. The meeting will take place March 20, at 9:30 a. m. in room 301, Industrial Building, Bureau of Standards, Washington.

## Fuels and Steelwork in January and February

Fuels	February, 1930	January, 1930	February, 1929
Bituminous coal(a), net tons.....	39,615,000	49,778,000	47,900,000
Anthracite(a), net tons.....	6,142,000	7,038,000	6,670,000
Beehive coke(a), net tons.....	274,300	309,200	440,200
Steelwork			
Trackwork for tee-rail track(b), net tons	12,524	11,830	12,180
Steel barrels shipped(c).....	.....	439,699	.....
do., unfilled orders(c).....	.....	465,158	.....
do., business volume(c).....	.....	\$1,309,906	.....

(a) United States Bureau of Mines.

(b) American Iron and Steel Institute.

(c) By members of Steel Barrel Manufacturers' Institute.

# Fabricated Structural Steel

Awards of 37,000 Tons Larger than in Previous Week—  
New Projects Include 10,000 Tons for Russia

**S**TRUCTURAL steel awards in the past week showed an increase, with a total of more than 37,000 tons, and new projects totaling about 22,500 tons were also slightly larger than in the previous week. Among the larger tonnages placed were 6000 tons for a Brooklyn hospital, 5000 tons for grade crossing elimination on the Long Island Railroad and 4000 tons for oil tanks in East Chicago, Ind., and Ponca City, Okla. A large part of the total of new projects is 10,000 tons for shipment to Russia. The only other inquiry for more than 1000 tons was a highway bridge in Baltimore requiring 2000 tons. Awards follow:

CAMBRIDGE, MASS., 275 tons, Harvard University power house, to American Bridge Co.

NEW YORK, 2570 tons, roadway underflooring for Manhattan Bridge, to American Bridge Co.

NEW YORK, 660 tons, School of St. Albany, to Buckingham Steel Co.

NEW YORK, 150 tons, bridge for Rapid Transit Co., to Gilbert Steel Co.

NEW YORK, 200 tons, addition to insurance company building, reported to A. E. Norton.

NEW YORK, 1920 tons, building at Christopher and Fourth Streets, to Easton Structural Steel Co.

NEW YORK CENTRAL RAILROAD, 400 tons, bridge at East 144th Street, New York, to Phoenix Bridge Co.

LONG ISLAND RAILROAD, 5000 tons, improvements at Ozone Park, to Bethlehem Steel Co.

YORKTOWN, N. Y., 2000 tons, arch bridge, to Mount Vernon Bridge Co.

BROOKLYN, 6000 tons, Kings County Hospital, to Taylor-Fichter Steel Construction Co.

BURLINGTON, N. J., 2500 tons, toll bridge, to McClintic-Marshall Co.

PHILADELPHIA, 250 tons, public school at Tasker and Thirty-third Streets, to unnamed fabricator.

PHILADELPHIA, 500 tons, Firemen's Insurance Co. building, to Bethlehem Fabricators, Inc.

CHARLESTON, W. VA., 3300 tons, State Capitol, to Wheeling Structural Steel Co.

OMAR, W. VA., 1500 tons, 10 coal barges for Ohio River Co., to Dravo Contracting Co.

BURFORD, ONT., 350 tons, new plant for Canadian Aggregates, Ltd., to Disher Steel Construction Co.

DETROIT, 580 tons, Michigan Bell Telephone Co., to R. C. Mahon Co.

MILWAUKEE, 700 tons, viaduct, to Wisconsin Bridge Co.

MILWAUKEE, 500 tons, building for A. O. Smith Corporation, to Milwaukee Bridge Co.

MILWAUKEE ROAD, 300 tons, bridge work, to an unnamed bidder.

CHICAGO, 350 tons, Volta School, to A. F. Anderson, Chicago; previously reported to an unnamed bidder.

CHICAGO, 100 tons, Cromwell Paper Co., to Duffin Iron Co.

CHICAGO, 450 tons, Walgreen Drug Co., to Duffin Iron Co.

EAST CHICAGO AND PONCA CITY, 4000 tons, tanks for Empire Refining Co., to Chicago Bridge & Iron Co.

STATE OF IOWA, 200 tons, highway bridges, to American Bridge Co.

KANSAS CITY, Mo., 600 tons, addition to Dierks Building, to Kansas City Structural Co.

SUGAR CREEK, Mo., 750 tons, power house for Standard Oil Co., to McClintic-Marshall Co.

TULSA, OKLA., 200 tons, steel derricks for Carter Oil Co., to Jones & Laughlin Steel Corporation.

MESA, ARIZ., 100 tons, plates and shapes, 200,000-gal. steel tank and tower for city, to Pittsburgh-Des Moines Steel Co.

SEATTLE, 300 tons, plates, 40 tanks for Shell Oil Co., to Commercial Boiler Works.

LOS ANGELES, 286 tons, apartment building, 530 South Kingsley Drive, to McClintic-Marshall Co.

PASADENA, CAL., 165 tons, machine shop for California Institute of Technology, to Consolidated Steel Corporation.

SOUTH PASADENA, 100 tons, Masonic Lodge, to Consolidated Steel Corporation.

SAN FRANCISCO, 300 tons, plant for Link-Belt Co., to Austin Co.

## Structural Projects Pending

Inquiries for fabricated steel work include the following:

BOSTON, 250 tons, Edison Electric Illuminating Co., Scotia Street plant extension.

## Reinforcing Steel

### Sea Wall Takes 7800 Tons—New Projects 7000 Tons

WITH awards of 12,000 tons in the past week, the outstanding job was 7800 tons for a sea wall at Lake Pontchartrain, La. A bridge at Rochester, N. Y., will take 1500 tons. About 7000 tons was added to the pending list. The largest project, 3000 tons for the American Can Co. at Chicago, probably will be closed this week. Awards follow:

BOSTON, 615 tons, Sears, Roebuck & Co. store addition, to Concrete Steel Co.

CLIFTON, N. J., 500 tons, Wanaque reservoir, to Igoe Brothers.

SEWAREN, N. J., 100 tons, for foundation of oil tank, to Igoe Brothers.

ROCHESTER, N. Y., 1500 tons, bridge, Booth & Flinn Co., general contractor, to Truscon Steel Co.

MEMPHIS, TENN., 150 tons, Post Office addition, to Laclede Steel Co.

LAKE PONTCHARTRAIN, LA., 7800 tons, sea wall, to Concrete Steel Co.

CHICAGO, 120 tons, work for Sanitary District, to Concrete Engineering Co.

SUPERIOR, WIS., 500 tons, grain elevator, to Concrete Steel Co.; previously reported to an unnamed bidder.

SACRAMENTO, 108 tons, bridge in Siskiyou County, to an unnamed bidder.

TACOMA, 100 tons, building for Goodwill Industries, to Northwest Steel Rolling Mills.

WESTERLY, R. I., 150 tons, high school. NEW YORK, 1000 tons, apartment building, Park Avenue and Thirty-fourth Street.

NEW YORK, 1000 tons, addition to Mount Sinai Hospital on Fifth Avenue.

TROY, N. Y., 600 tons, building at Rensselaer Polytechnic Institute.

KEARNY, N. J., 700 tons, highway bridges.

PASSAIC, N. J., 500 tons, addition to warehouse, Turner Construction Co., general contractor.

PENNSYLVANIA RAILROAD, 600 tons, highway bridges.

STATE OF NEW JERSEY, 325 tons, bridges at Pensauken; Atlantic Construction Co. low bidder on general contract.

BALTIMORE, 2000 tons, highway bridge.

TORONTO, 300 tons, Bruce School, for Board of Education.

KOMOKO, ONT., 150 tons, bridge; Charles Talbot, County Building, London, engineer.

CLEVELAND, tonnage unstated, 14-story department store for Cleveland Terminal Building Co.

RUSSIA, 10,000 tons, Albert Kahn, Detroit, architect.

MEXICO, 1600 tons, transmission towers.

STATE OF KENTUCKY, 700 tons, highway bridges.

ILLINOIS CENTRAL RAILROAD, 500 tons, bridge work.

CHICAGO & EASTERN ILLINOIS, 200 tons, girder spans.

CHICAGO, 1300 tons, building on California Avenue for Commonwealth Edison Co.

MILWAUKEE, 350 tons, armory for 105th Cavalry, W. N. G.; Worden-Allen Co., low bidder.

LA CROSSE, WIS., 140 tons, miscellaneous bridge work for State Highway Commission; bids close March 28.

NYSSA, ORE., 105 tons, Owyhee project, United States Bureau of Reclamation.

SEATTLE, 400 tons, shop for Naval air station; bids opened.

SEATTLE, 300 tons, Fourteenth Avenue South bridge, to Northwest Steel Rolling Mills.

SEATTLE, 600 tons, divided between Pacific Coast Steel Corporation and Northwest Steel Rolling Mills.

## Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

PASSAIC, N. J., unstated tonnage, building for United States Rubber Co.

NJEWARK, N. J., 250 tons, National Lock Washer Co. factory; Shore Construction Co., contractor.

BRENTWOOD, N. Y., 1000 tons, Pilgrim State Hospital.

PHILADELPHIA, 300 tons, Liberty-Lincoln Building, Broad and Walnut Streets.

CINCINNATI, 350 tons, viaduct for city.

GALESBURG, ILL., tonnage being estimated, sewage disposal plant.

WAUKESHA, ILL., 625 tons, central station for Public Service Co. of Northern Illinois.

CHICAGO, 520 tons, building for Continental Can Co.; R. F. Wilson & Co., general contractor.

CHICAGO, tonnage being estimated, building for Commonwealth Edison Co., at Addison and Lawrence Avenues.

CHICAGO, tonnage being estimated, addition to the Morrison Hotel.

CHICAGO, 3000 tons, buildings for American Can Co.

MILWAUKEE, tonnage being estimated, Northwestern Mutual Life Insurance Co. building.

TACOMA, WASH., 1000 tons, Medical Arts Building; bids being taken.

A. L. FINDLEY  
*Editor*

# THE IRON AGE

W. W. MACON  
*Managing Editor*

ESTABLISHED 1855

## The Battle of Giants

**A**BATTLE of giants, as newspaper headlines have it, is on. Arrayed on one side are Eugene G. Grace and James A. Campbell, leading steelmasters, and on the other stands Cyrus S. Eaton, builder of mergers. The stake is the Youngstown Sheet & Tube Co., the sale of which to the Bethlehem Steel Corporation has been approved by the directors of both companies, but still requires ratification by holders of two-thirds of the common shares of the Youngstown company.

The Cleveland financier, stepping out of his usual rôle, is throwing his influence against the proposed consolidation. Both sides of the contest are conducting organized campaigns for proxies and the result will not be definitely known until the Youngstown stockholders actually cast their ballots, April 8.

Opposition to the consolidation is based on the alleged grounds that it would hurt the local interests of the city of Youngstown and that the terms are unfair to Youngstown company stockholders. It is significant that there is no mention of "monopoly," "trust" or "stifled competition"—words that were all too familiar a generation ago. The steel industry has gone a long way since the United States Steel Corporation was formed in 1901. Then fear of so large a corporate unit was not confined to radicals but was shared by many of the more conservative elements.

In commenting on the organization of the Steel Corporation the *Engineer*, London, said early in 1901:

The situation is without precedent. The trust will be able to manufacture over 12,000,000 tons of pig iron every year, and at least three-quarters of the steel used in the United States . . . . What will be the result? As matters stand Mr. Morgan and his immediate partners can fix the price of iron and steel. They are, for the moment to all events, beyond the fear of competition . . . . The American consumer is absolutely in the hands of the trust.

It is unnecessary to point out how much this prophecy erred. History speaks for itself. Bethlehem, chiefly an armament plant and unimportant as a producer of rolled steel in 1901, now has a capacity approximating that of the Steel Corporation when it was formed. Youngstown, in its swaddling clothes 29 years ago, is now the fourth largest steel producer in the country. The capacity of Bethlehem and Youngstown together is four-fifths of greatest production of post-war Germany and far ahead of the largest output of either Great Britain or France.

Size has ceased to frighten the consumer. On the contrary, it assures him an unremitting campaign to reduce costs, since it has been demonstrated that

volume, and not price, is the key to steel company profits. The proposed consolidation, if it strengthens the merged organization, may actually accentuate competition. It may further stimulate progress in technical research to cheapen output and in trade research to broaden uses.

With keen foresight, at a time when the true significance of integration was appreciated by few, THE IRON AGE said editorially Feb. 28, 1901:

The steady reduction in costs, which is the result of technical improvements, of the introduction of labor-saving appliances, of the lessening of waste and the utilization of by-products, means an irresistible tendency toward lower prices. The economies due to consolidation, which take the form of cheaper assembling of raw materials, lessened general expenses, decreased cost of distribution and marketing, must be large in the aggregate, and they must be shared in an equitable manner with the consumer.

These operate in the same direction of reducing market prices, in spite of any effort that may be made by any organization, powerful though it may be.

This opinion has a strangely recent ring. It reflects an early understanding of the fact that the steel producer is primarily a purveyor to the ultimate consumer.

The battle for proxies will soon be decided one way or the other, but the greater battle of giants will continue—the battle of technical and trade development, of organization and management, the battle to share economies in production and distribution with the consumer.

## An Average Year in Steel

**N**OW that nearly one-fourth of the year has passed it is well to revert to predictions made last December, that this would be an average year in steel, not particularly good and not particularly bad. Mr. Farrell predicted "a good average year," and the expression is not difficult to interpret. By "average" is meant the average of only a few recent years, for striking the average of a large number of years would be having quite a setback. The connotation of "good," of course, is that on an average steel does well, hence it needs merely to conform to its average, not to its best showing.

The way this year started out, in approximately its first six weeks, it appeared to give promise of being much better than average, and rather approaching its best. It was easy to construct a theory that, when recovery in fundamental conditions was in progress and spring and summer activity still in future, there would be further and substantial gains, but it

was obvious at the time that such reasoning was altogether hazardous because it would prove altogether too much by indicating an exceptionally good if not a record year.

Then there was a slipping, only a slight one, but impressive on account of its occurring at a time when usually steel is expanding. There was disappointment, which averaged up with the surprise of late January that steel was then doing so remarkably well.

What has occurred to date suggests quite definitely that steel is not lined up this year to follow its usual and familiar seasonal trend in volume of buying and production. That trend has been well established. The usual and perhaps in a sense "normal" course has been for peak production of the year to occur in March, with declining production to July, increases to a secondary peak in October and a mild tapering off late in the year.

The second half of the year generally runs under the first half. It contains both low points of the year, July and December. March is not always the high month, for in 1923 and 1928 April was higher, while in 1929 May was the high month. In 1923, 1927 and 1929 there was no autumn increase. None of the special conditions prevailing in those years can be conceived for the present year.

One cannot imagine any logical reason why in this year of all years the peak production should come earlier than ever before. All that we know is that apparently a peak, at about the middle of February, has been left behind. There may be several bulges, in which case we should confuse matters by calling each a peak. Rather we should look upon the matter as involving fluctuations instead of the marked long swings that have occurred in other years.

As one cannot imagine with existing conditions that preparations for spring work have been made earlier than usual, it follows that steel has before it certain outlets through which more steel should flow in the nearby future. On the other hand, when the sum total of steel movement lately has made such a favorable comparison with general trade conditions as commonly appraised, there is room for suspicion that some of the recent activity has been a sort of survival of old activity or conditions, momentum, in a sense, and that of course would yield except as fresh impetus were supplied. Again there are indications of opposing or averaging influences.

### Reciprocity in Buying and Selling

ONE hears a good deal these days about the evils or alleged evils of reciprocal buying and selling. To those who must depend exclusively on sales efforts and the merits of their products, the use of reciprocal arrangements by their competitors may appear as inimical. Reciprocity, it remains, has been the basis of a large amount of trading for many years. The difference today is that the phenomenal growth of inter-company relationships through stock ownerships has added materially to the number and importance of the deals that are made in this way.

Railroads have conspicuously played favorites in buying. Purveyors of supplies and equipment who are off the railroad line have usually taken it for granted that orders will go to plants which, being on the line, are good patrons of the road in the way of freight.

Not even the provisions of the Clayton Act, which makes it necessary for railroads to advertise publicly for bids where interlocking directorates exist, have changed this situation very much. The railroads take bids, but the orders still go, to a large extent, to shippers on the road.

Another phase of the reciprocal business is the simple one of swapping orders. For example, a public utility company which owns a blast furnace recently placed an order for a tonnage of cast iron pipe. The deal is said to have been arranged with the understanding that the cast iron pipe company would buy an equivalent tonnage of pig iron from the public utility company's blast furnace. This may have the effect of stifling competition, but it represents a practice that exists in almost every form of business from the neighborhood retail center to the largest forms of corporate enterprise. Unless it assumes a seriousness that threatens to act as a restraint of trade there is perhaps nothing that can be done about it.

In some large corporations with widespread interests it is now not unusual for one man to be given the responsibility of checking up between the purchasing department and the sales department to see that all possible sales are made to those from which supplies are purchased.

The slogan "we buy from those who buy from us" is coming to mean what it says among many large industrial institutions, but it does not necessarily stand for uneconomic interchange; it is probably unduly magnified in the foreshortened perspective in which the latest lost order is commonly beheld.

### The Romance of Nickel

**T**HIS is a story of an industrial Golconda in comparison with which the romance of the Count of Monte Cristo is picayune. It is one in which American, British and Canadian financiers, engineers and investors jointly participate and it constitutes a link among the three nations that is of a nature for rejoicing.

The recent issuance of the annual report of the International Nickel Co., which has adopted a policy of praiseworthy frankness to its stockholders and the public, and one that is in harmony with its high position, enables us to tell the story, although we shall draw upon it only for statistics.

The copper-nickel mines of Sudbury, Ont., have long been exploited, going back 40 years or so. The ore used to be brought to the historic Orford works at Bayonne. The metallurgy was not simple, but the dawn of a new day came with the invention of the "top and bottom" process. Then came the process of smelting and refining to Monel metal, a natural copper-nickel alloy. And finally the process of producing electrolytic nickel. So there has been a series of metallurgical triumphs.

During the Great War nickel was essentially a military metal. The British and Canadians were naturally averse to having the beneficiation of Sudbury ore occur outside of the Empire, and the company, which was then under American control, without demur acceded to transferring its metallurgy to Canada. The Mond Nickel Co., a British concern, was then a minor producer.

With the end of the War and the cessation of mili-

tary demand the outlook for the nickel producers was gloomy. The stock of the International Nickel Co. was regarded askance, not for impairment of resources but owing to the fear that they could not be readily marketed. In this juncture the management set about creating an industrial demand by research and propaganda. The brilliancy of its success in itself is a romance.

There is therefore a striking record of metallurgical intelligence and business intelligence. As if nature wished to bestow a reward there followed the discovery of the fabulous Frood mine, but perhaps mining intelligence had something to do with that. This great orebody proved to lie partly within the territory of the International Nickel Co. and partly within that of the Mond Nickel Co., wherefore the two companies in 1928 naturally consolidated.

None of the foregoing is in the recent report of the company. Corporate modesty would probably forbid some of our adjectives if not a review of its accomplishments. However, we may now draw upon the report.

At the end of 1929 the Sudbury mines had developed 202,620,000 tons of ore, whereof 134,673,000 was in the Frood mine, and the latter averaged 2.39 per cent copper and 3.62 per cent nickel, besides an important tenor of platinum and palladium. Such a combination of quantity and quality has not heretofore been known in the history of mining. The mining and metallurgical equipment for this mine is running to an expenditure of \$40,000,000. In 1929 the company produced and sold about 63,000 tons of nickel (about 93 per cent of the world's total) and about 41,000 tons of copper.

Of great interest is the rapidly increasing use of nickel in steels. On this subject the International Nickel Co. reports as follows:

Each of the principal uses of nickel gained ground during 1929, and it is most gratifying that sales of no important type of nickel steel or nickel alloy are lagging.

In the automotive industry large quantities of nickel were consumed and high-percentage nickel steels are now standard materials used in the manufacture of tractors, trucks and buses. Similar steels are also specified for at least 90 per cent of modern airplane engines.

The use of nickel steel is rapidly progressing in locomotive construction. Many railroads are using or are now experimenting with nickel steel and nickel cast iron for such purposes as boiler shells, tubes, forgings, stay-bolts and frames, cylinders and other castings. This field is a promising outlet for a large tonnage of nickel.

Stainless steels and irons containing 8 to 12 per cent of nickel are rapidly coming into prominence. Sales of nickel for this requirement increased over 400 per cent during 1929. There is every reason to believe that the manufacture of stainless steel is in its initial stage and will ultimately become one of the principal outlets for nickel. Large quantities of this alloy will be used for automobile radiators, lamps and trim in 1930.

The use of nickel in cast iron and in cast steel has expanded satisfactorily. Several of the high-nickel content irons, such as corrosion and growth resisting iron, high-strength iron and hard chilled iron, are being vigorously developed for a great variety of applications. Sales of nickel to foundries

increased 50 per cent in 1929 and continued progress may be expected.

We get another reaction through the copper and brass manufacturers in respect to the subject of stainless steels. They report that they are feeling its competition. This is another view of the kaleidoscopic and interesting changes from the use of one metal to another. Competition is always broader than what obtains among the sellers of any one metal, although each may have certain fields of indispensable use.

### Playing the Wheat Market

LAST week many thousands of American citizens, the majority of them in the northeastern part of the country, paid the first quarterly instalment of their Federal income tax for 1929. Most of them doubtless did so as the fulfilment of a disagreeable obligation, with no further thought on the subject. Some thoughtful persons, however, in signing their checks experienced political and economic reflections.

Specifically they recalled the recent declaration by the President that if the present Congress should appropriate any more money than is already earmarked it would have to be supplied by further taxation, the Treasury having no surplus.

Following this they brought to mind the demand of the Farm Board for an emergency appropriation of a hundred million dollars.

When the farm bill was up for action less than a year ago we said in these pages that the alternative proposals were to give the wheat growers a bonus on production or to give them a half billion dollars with which to play the market. We added that the former proposal was so preposterous and dangerous that the country could not consent to it, but as to the latter it might be money well appropriated, even if lost, if it would allay the agrarian discontent and cause its political representatives to abstain from rocking the economic boat.

It is less than a year since the President called Congress to an extra session. In this short space of time we have seen that the playing of the wheat market is not being successful and that the wheat growers are not being pacified.

The plain fact is that the Farm Board is engaged in a plan for holding wheat in the hope of obtaining a higher price. Mr. Legge, its chairman, assures us that no loss has yet been incurred, meaning that the minus difference between the loaning rates and the market quotations has not yet become a subject of entry on his books, and he hopes that the market will recover; but in the same breath he admits that the outlook for wheat price is dismal and expresses the opinion that the only salvation for the American wheat grower is to reduce production by 10 per cent anyway, and preferably by 20 per cent, adding that "no other industry in the world blindly produces without any attention to potential market possibilities." But curtailment is just what the American wheat grower is unwilling to practice.

Looking at this situation, and remembering the three billion dollar loss of the public money in the shipping adventure, the tax-payer ought to be horror-stricken. The money is drawn from the Northeast at

## The Week in Business

### Drift of Current Financial and Economic Opinion

FEARS of an impending scarcity of monetary gold are freely expressed by a number of economists, the first result being predicted as a slowly declining commodity price level, with attendant stagnation in business, unemployment and general distress. Thus, from the Harvard Economic Society:

#### Long Time Price Trend Downward

"We can be certain that the current annual increment of 2 per cent in the world's supply of monetary gold is not sufficient to permit commodity prices to rise continuously in gold standard countries [all the important commercial nations] as they did for 18 years before the World War, when the annual increment was something like 4 per cent."

#### Nearby Price Trend

But the National Industrial Conference Board has this to say of the near view: "The downward trend of commodity prices has caused hesitation. . . . In the absence of any conspicuous accumulation of [commodity] stocks when the October stock [market] slump made its influence felt in commodity markets, this continued fall in prices raises the suspicion that current production cannot be readily absorbed by the market."

"The sharp decline which started some months ago," to quote again

the Harvard Economic Society, "has indeed been regarded by many persons as the beginning of the long, downward movement so frequently predicted in recent years. This it may prove to be; but there is more reason for regarding it as the inevitable aftermath of credit strain produced throughout the world by the excessive flow of funds into stock-exchange speculation in the United States. . . . We attribute the recent decline of commodity prices to the high interest rates resulting from the excessive absorption of credit in stock speculation. We believe that easy money, such as seems definitely in prospect and to be favored by central bank authorities everywhere, will presently stabilize commodity markets and then lead to an upturn of prices. . . . One cannot reasonably doubt . . . that the rate of interest at which dollar exchange can be secured has been a prime factor in determining movements of international commodity prices."

"That the lower discount rate will stimulate the activity of the stock market is a logical expectation," says the *Annalist*, New York, "and to the extent to which such increased activity is kept within bounds, it may be temporarily comforting for its effect on business sentiment. That it should be in any real sense remedial of present

disturbed and abnormal conditions need not be expected. . . . Recovery from the present stage depends clearly enough upon business outside of the steel industry. . . . There is unwelcome evidence that even now business men are borrowing heavily upon their life insurance policies—a course which not only diminishes building funds but is a sign of present difficulties quite apart from the construction industry."

#### Building Outlook

That building construction has fair weather ahead is the view of S. W. Straus & Co., who say, "It should not be forgotten that this let-up in activities is forming a base for a prosperous era of operations in the near future."

*Commerce and Finance* is more optimistic: "Commodity prices are already down to a level which will attract buyers and increase consumption. This effect will not be immediately apparent, but the law of supply and demand is still in operation and increased consumption of the world's great staples as prices decline is as certain as that day will follow night. . . . When the tide turns we shall probably see the greatest activity on record in the commodity markets, at a price level which will help to compensate the farmer for the losses he has recently been compelled to accept."

the behest of people in the South and West who do not contribute much toward Federal income taxes, but it does no one any good.

coincides with theirs, that the aforesaid countries are not metric at all, so far as the bulk of the population is concerned.

In any event, the only advantages of the metric system are those involved in decimal calculations. Has anyone ever found any difficulty in measuring or calculating in decimal inches or feet? Also, Mr. Mossberg, under the present law, may manufacture to metric standards if he so desires.

JAMES TATE.

1647 West 100th Place, Chicago.

## CORRESPONDENCE

### "Metric" Countries Not Always Metric

To the Editor: If Mr. Mossberg (see page 668, THE IRON AGE, Feb. 27) will peruse "The Metric Fallacy," issued by the American Institute of Weights and Measures, he will find that there is at least one large fallacy in his statement that "practically 90 per cent of the population of the entire world has adopted this (the metric) system." It is true that a large number of countries have officially adopted the metric system, but this does not mean by any means that the metric system is in common use in those countries.

I am not connected in any manner with the American Institute, but my experience in so-called "metric" countries

After two years of analytical investigations by the chief chemists of the by-product coke oven plants of the United States Steel Corporation, a third edition has been published of "Methods for Sampling and Analysis of Coal, Coke and By-Products" (348 pages, 6x9 in., 55 illustrations, 7 tables. Carnegie Steel Co., Pittsburgh. Price \$3). The accuracy of each method described has been carefully verified in different laboratories by check tests that are the approved procedure for all steel corporation plants. Thirty pages or more are given to the problems of getting a correct sample and maintaining it in such a way that its moisture or vapor content does not change, a matter, of course, of fundamental importance, but too often neglected in inexperienced hands.

## Iron and Steel Markets

### Decline in Steel Output Arrested

Upturn in Demand Is Still Lacking But Open Weather Is Counted on to Stimulate Activity—Alabama Iron Down \$1

THE downward trend of steel specifications has been to a large extent arrested but, with buying at close range, mills lack their customary large backlog as the second quarter approaches.

Scattered evidences of expanding activity are seen in certain lines of consumption, but no broad upturn in steel demand is yet in sight. With prompt deliveries obtainable from the mills and with the price situation by no means clear cut, steel users have little inducement to commit themselves very far ahead. It is also possible that the disposition of the automobile industry to await developments that open weather may bring extends to other groups.

In fact, indications are accumulating that the imponderables introduced into the business situation by the stock market crash have generally accentuated caution, particularly among manufacturers of consumer goods, and have discouraged the anticipation of expected spring requirements in steel and other materials.

Steel production has undergone a further decline in the Valleys, but is holding its own in most centers, with the average for the entire country only a shade below the 75 per cent rate of a week ago.

Rail mills continue to operate at capacity and tin plate production holds at 85 per cent. Railroad equipment business has been light of late, but present commitments of car builders will keep them busy well through the first half of the year. Steel producers are also getting good support from the structural steel fabricators. Current awards of fabricating work, at 37,000 tons, compare with 22,500 tons last week and an average of 33,250 tons since the first of the year. The comparable weekly averages in 1929 and 1928 were 36,800 tons and 42,900 tons respectively. Outstanding among new pending projects is 10,000 tons for shipment to Russia.

The large highway construction program for this year is stimulating activity among road machinery makers and will, no doubt, soon be reflected in orders for an increasing tonnage of reinforcing steel. Concrete bar awards this week were heavy, totaling 12,000 tons, although not on account of highway work. The outstanding letting, 7800 tons, was for a sea wall at Lake Pontchartrain, La.

Demand for light rolled steel products shows little improvement, bookings thus far in March ranging from 50 to 55 per cent of capacity. Makers of barrels, drums, stoves, ranges and electric refrigerators are reported to be taking more sheets, but the requirements of the automotive industry are still at a low level. Motor car output, in the aggregate, has taken no turn for the better. A leading maker of low-priced cars has cut down production to 1500 units a

day and another manufacturer in the same class is reported to be turning out less than 4000. Moderate gains, however, have been made by two other important interests.

With so much hinging on the influence of open weather, signs of expanding outdoor activities are of particular interest. The Pure Oil Co. has placed a contract with the A. O. Smith Corporation for 192 miles of 10-in. pipe, calling for 17,500 tons, for a line from Van County, Tex., to Beaumont, while the Southern National Gas Corporation has placed 60 miles of 6-in. pipe, 2000 tons, for a natural gas line in Mississippi, with the National Tube Co. The Sun Oil Co. is expected to take action soon on a gasoline line from Marcus Hook, Pa., to Lake Erie, calling for 20,000 tons of 6 or 8-in. pipe. The Barnsdale Corporation is in the market for 40,000 tons of 6-in. pipe for an 800-mile gasoline line from Oklahoma to Milwaukee.

Steel prices are not well defined. Current orders, as a rule, are too small to bring out concessions; yet a sufficient number of price cuts have been reported to disturb the confidence of the trade. Sales of cold-rolled strip steel have been more commonly made at 2.55c., or \$2 a ton below the recent minimum. Further business in black sheets has been taken at as low as 2.55c., and, since at least two large producers have not yet shared in recent attempts to advance sheet prices, indications are that the industry will be satisfied to continue present quotations.

Tonnage orders in plates, shapes and bars continue to be taken at 1.80c., Pittsburgh, and that price has been shaded \$1 a ton in extreme cases. Manufacturers' wire has been sold at \$2.30, although reports from the Central West are that concessions on this product are disappearing. Irregularities in line pipe are expected to be straightened out by a schedule of quantity discounts just announced.

The pig iron market is spotty both as to the volume of buying and the rate of melt. In certain districts a fair amount of second-quarter business has been placed, but many melters will have a large carry-over of first-quarter iron. Foundry iron at Birmingham has declined \$1 to \$14 a ton. Lake Erie furnaces have reduced prices 50c. a ton on iron for shipment to northern Indiana and Michigan.

Scrap is weak in most centers, heavy melting steel having declined 25c. a ton at Pittsburgh and 75c. a ton at Cleveland.

Fabricated structural steel orders in February (computed) were 292,000 tons, compared with 252,000 tons in January, and 265,650 tons in February, 1929.

The Ford Motor Co. has contracted for 190,000 tons of Wabana ore for 1931-1933 delivery to its Dagenham, England, plant.

## A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous,  
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	Mar. 18, 1930	Mar. 11, 1930	Feb. 18, 1930	Mar. 19, 1929
No. 2 fdy., Philadelphia.....	\$20.26	\$20.26	\$20.76	\$21.26
No. 2, Valley furnace.....	18.50	18.50	18.50	18.00
No. 2 Southern, Cin'ti.....	16.69	16.69	17.19	19.19
No. 2, Birmingham.....	<i>14.00</i>	15.00	14.50	15.50
No. 2 foundry, Chicago*.....	19.50	19.50	20.00	20.00
Basic, del'd eastern Pa.....	19.00	19.00	19.50	20.25
Basic, Valley furnace.....	18.50	18.50	18.50	17.50
Valley Bessemer, del'd P'gh.....	20.76	20.76	20.76	20.26
Malleable, Chicago*.....	19.50	19.50	20.00	20.00
Malleable, Valley.....	19.00	19.00	19.00	18.50
L. S. charcoal, Chicago.....	23.04	23.04	27.04	27.04
Fermanganese, furnace.....	94.00	94.00	94.00	105.00

Rails, Billets, Etc., Per Gross Ton:	Mar. 18, 1930	Mar. 11, 1930	Feb. 18, 1930	Mar. 19, 1929
Rails, heavy, at mill.....	\$43.00	\$43.00	\$43.00	\$43.00
Light rails, at mill.....	36.00	36.00	36.00	36.00
Rerolling billets, Pittsburgh.....	33.00	33.00	33.00	34.00
Sheet bars, Pittsburgh.....	33.00	33.00	33.00	35.00
Slabs, Pittsburgh.....	33.00	33.00	33.00	34.00
Forging billets, Pittsburgh.....	38.00	38.00	38.00	39.00
Wire rods, Pittsburgh.....	38.00	38.00	40.00	42.00
Cents	Cents	Cents	Cents	
Skep, grvd. steel, P'gh, lb.....	1.85	1.85	1.85	1.85

Finished Steel,	Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh.....		2.65	2.65	2.60	2.85
Sheets, black, No. 24, Chicago dist. mill.....		2.75	2.75	2.75	3.05
Sheets, galv., No. 24, P'gh.....		3.30	3.30	3.30	3.60
Sheets, galv., No. 24, Chicago dist. mill.....		3.40	3.40	3.40	3.80
Sheets, blue, No. 13, P'gh.....		2.25	2.25	2.25	2.20
Sheets, blue, No. 13, Chicago dist. mill.....		2.35	2.35	2.35	2.40
Wire nails, Pittsburgh.....		2.25	2.25	2.25	2.65
Wire nails, Chicago dist. mill.....		2.35	2.35	2.35	2.70
Plain wire, Pittsburgh.....		2.40	2.40	2.40	2.50
Plain wire, Chicago dist. mill.....		2.45	2.45	2.45	2.55
Barbed wire, galv., P'gh dist. mill.....		2.95	2.95	2.95	3.30
Tin plate, 100 lb. box, P'gh.....		\$5.25	\$5.25	\$5.25	\$5.35

Finished Steel,	Per Lb. to Large Buyers:	Mar. 18, 1930	Mar. 11, 1930	Feb. 18, 1930	Mar. 19, 1929
Sheets, black, No. 24, P'gh.....		2.65	2.65	2.60	2.85
Sheets, black, No. 24, Chicago dist. mill.....		2.75	2.75	2.75	3.05
Sheets, galv., No. 24, P'gh.....		3.30	3.30	3.30	3.60
Sheets, galv., No. 24, Chicago dist. mill.....		3.40	3.40	3.40	3.80
Sheets, blue, No. 13, P'gh.....		2.25	2.25	2.25	2.20
Sheets, blue, No. 13, Chicago dist. mill.....		2.35	2.35	2.35	2.40
Wire nails, Pittsburgh.....		2.25	2.25	2.25	2.65
Wire nails, Chicago dist. mill.....		2.35	2.35	2.35	2.70
Plain wire, Pittsburgh.....		2.40	2.40	2.40	2.50
Plain wire, Chicago dist. mill.....		2.45	2.45	2.45	2.55
Barbed wire, galv., P'gh dist. mill.....		2.95	2.95	2.95	3.30
Tin plate, 100 lb. box, P'gh.....		\$5.25	\$5.25	\$5.25	\$5.35

Old Material, Per Gross Ton:	Mar. 18, 1930	Mar. 11, 1930	Feb. 18, 1930	Mar. 19, 1929
Heavy melting steel, P'gh.....	\$16.50	\$16.75	\$17.00	\$18.50
Heavy melting steel, Phila.....	15.00	15.00	14.50	16.00
Heavy melting steel, Ch'go.....	13.25	13.25	13.50	15.50
Carwheels, Chicago.....	<i>14.50</i>	14.75	15.00	14.50
Carwheels, Philadelphia.....	15.00	15.00	15.00	16.50
No. 1 cast, Pittsburgh.....	14.50	14.50	14.50	15.25
No. 1 cast, Philadelphia.....	15.00	15.00	15.00	16.00
No. 1 cast, Ch'go (net ton).....	13.75	13.75	14.00	16.00
No. 1 R.R. wrot., Phila.....	15.00	15.00	15.00	16.00
No. 1 R.R. wrot., Ch'go (net).....	12.25	12.25	12.25	14.00

Coke, Connellsburg, Per Net Ton at Oven:	Furnace coke, prompt.....	\$2.60	\$2.60	\$2.60	\$3.00
Foundry coke, prompt.....		3.50	3.50	3.50	3.75

Metals,	Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.....	18.12 1/2	18.12 1/2	18.12 1/2	22.12 1/2	
Electrolytic copper, refinery.....	17.75	17.75	17.75	21.75	
Tin (Straits), New York.....	36.12 1/2	36.62 1/2	38.75	49.50	
Zinc, East St. Louis.....	4.95	5.00	5.20	6.35	
Zinc, New York.....	5.30	5.35	5.55	6.70	
Lead, St. Louis.....	<i>5.40</i>	5.35	6.10	7.37 1/2	
Lead, New York.....	5.50	5.50	6.25	7.50	
Antimony (Asiatic), N. Y.....	8.00	8.75	8.75	9.75	

\*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

## Pittsburgh

### Steel Trade Still Lacks Definite Trend—Producers Will Enter Second Quarter With Slim Backlogs

**PITTSBURGH**, March 18.—As the first quarter of the year approaches its close, the steel industry in this district fails to show any definite trend. Steel ingot production has again declined, most sharply in the Valleys, but production in the immediate Pittsburgh district still stands at close to 75 per cent of capacity. Two steel works blast furnaces went in last week, and two more, one a merchant stack, are scheduled to go in April 1.

In spite of such signs of well sustained activity, producers are almost unanimous in reporting extreme dissatisfaction with both the rate of incoming specifications and new business. This may be partly explained by the fact that March is ordinarily a month of rapidly increasing momentum, while this year it has fallen behind both January and February in demand for steel. The opinion persists in some quarters that the second quarter will bring improvement, but such improvement would lack the security of substantial backlogs which might be expected at this time of the year.

At this time in 1929 deliveries on many steel products were extended from four to six weeks, while today orders can be filled with little or no delay.

The larger consuming industries show little change in activity, although better sheet demand is reported from makers of stoves and ranges, electric refrigerators and barrels and drums. The automobile

industry has not increased its requirements, but shipments to two or three of the leading makers are fairly heavy.

Spring activity is gradually getting under way in the building trades, but orders for steel for such purposes are not reaching mills in significant volume.

Makers of pipe in both large and small sizes have some work ahead of them in the way of large projects.

The gas line from the Texas Panhandle into Chicago, to be built by the Doherty interests, seems likely to be let in the next 30 days and will take 200,000 to 250,000 tons of large diameter pipe. The Barnsdale Corporation is inquiring for 40,000 tons of 6-in. tubing for an 800-mile gasoline line from Oklahoma to Milwaukee, while 20,000 to 25,000 tons of similar material will be required for another line in Pennsylvania for the Sun Oil Co. Another project, not so definitely decided at this time, calls for 500 miles of 12-in. material to extend from Oklahoma to the Houston, Tex., ship canal.

Dull demand has had a weakening effect on the price structure, as a number of mills which seem to need tonnage badly have been willing to take business at concessions. Only lack of large inquiries has saved open breaks in the quotations on some products. Attempts to raise quotations on black and galvanized sheets apparently have failed, as at least two large producers have taken no action. Cold-rolled strip steel is being sold even in comparatively small tonnages at 2.55c., although hot-rolled material is still quotable at the old levels in this territory. Plates and shapes seem to be

settling to 1.80c., Pittsburgh, while bars are better maintained at 1.85c.

**Pig Iron.**—Shipments of several makers this month have fallen considerably behind those of the corresponding February period, largely because of the curtailed requirements of smaller steel producers. Foundry iron is moving in unchanged volume. Steel foundries and machinery and equipment builders are taking a fair amount of basic and Bessemer iron, but are buying in a restricted manner. The National Radiator Corporation has closed for a small part of the foundry iron for which it has been inquiring at New Castle, Pa., and the business developed no price concessions.

The market is now entirely lacking in any sizable general inquiry, and producers are making little effort to secure second quarter contracts. No official changes in the price structure are contemplated, and it is generally conceded that lower quotations would not stimulate business at this time. It has been several weeks since the market has had an adequate test on any substantial tonnage. Quotations stand at \$18.50, Valley, for basic and foundry iron and at \$19 for malleable and Bessemer.

*Prices per gross ton, f.o.b. Valley furnace:*  
Basic ..... \$18.50  
Bessemer ..... 19.00  
Gray forge ..... 18.00  
No. 2 foundry ..... 18.50  
No. 3 foundry ..... 18.00  
Malleable ..... 19.00  
Low phos., copper free ..... 27.00

Freight rate to Pittsburgh or Cleveland district, \$1.76.

*Prices per gross ton, f.o.b. Pittsburgh district furnace:*  
Basic ..... \$19.00  
No. 2 foundry ..... 19.00  
No. 3 foundry ..... 18.50  
Malleable ..... 19.50

Freight rates to points in Pittsburgh district range from 63c. to \$1.13.

**Semi-Finished Steel.**—A few small users of crude steel have come out with tentative inquiries for their second quarter requirements, but spot sales are negligible. Sellers of billets, slabs and sheet bars will take second quarter business at the prices which have prevailed recently, namely, \$33 a ton, Pittsburgh or Youngstown. The Cleveland maker is also expected to reaffirm this price.

Users of forging billets are increas-

ing their requirements slightly, and the price is holding at \$38, Pittsburgh. Wire rods are quiet, although some makers report that a number of their regular customers have entered second quarter contracts at the recently established price of \$38, Pittsburgh or Cleveland.

**Bars, Shapes and Plates.**—The market for heavy hot-rolled products is dull, although specifications are reaching mills in fair volume. The lull in demand for steel products, which has prevailed since late in February, has had little effect on plate and shape tonnage, but, on the other hand, business has not improved. Structural awards in this district are not numerous, and generally call for small tonnages. This has seriously affected the operations of the smaller fabricating shops, some of which are badly in need of tonnage. The larger interests are well occupied, but are eating into their backlog.

The approach of warmer weather has revived barge business slightly, and 10 coal barges, calling for 1500 tons of plates, were placed in this district last week. Bids will be taken March 19 on the 50 to 60 barges which the Standard Unit Navigation Co. is inquiring for. These will require 5000 to 6000 tons of steel.

Specifications from the railroad car builders are in fair volume, but hardly up to the point which might be expected in view of the comparatively large backlogs of nearby shops. The Norfolk & Western is rebuilding 1000 hopper cars at its Roanoke, Va., shops, and will take bids on March 26 for 2500 tons of plates, shapes and bars, its second quarter requirements.

Bar mill operations continue at 60 to 65 per cent of capacity. Cold-finishing units are running at reduced levels, thereby seriously handicapping the operations of some bar mills.

Warmer weather is stimulating activity in reinforcing steel, and several thousand tons is pending in the Pittsburgh district for road and bridge work, which will likely be placed in the next month. A highway bridge at Rochester, N. Y., requiring 1500 tons of reinforcing bars, has been let to Truscon Steel Co.

Prices on bars are holding at 1.85c.

in the Pittsburgh district, but plates and shapes are hardly as strong, with 1.80c. applying on considerable buying.

**Rail and Track Supplies.**—The New York, New Haven & Hartford Railroad is inquiring for 5000 kegs of spikes for second quarter delivery, and the Pennsylvania will take bids on March 21 for its track accessory requirements during the second quarter. Otherwise the market is rather quiet, although specifications are keeping up at a good rate and operations are reasonably good. The local rail mill is running at practical capacity, but demand for light rails is very dull.

**Tubular Goods.**—Increased activity is developing in the pipe business, although individual orders are not impressive. The Southern National Gas Corporation has placed 60 miles of 6-in. lap-welded pipe for a natural gas line in Mississippi with the National Tube Co. This will take slightly over 2000 tons of pipe. The Milwaukee maker has taken a fair-sized order in the Texas oil country, and a number of other projects are pending which may be placed in the next two or three weeks. The Sun Oil Co. is expected to take action in the near future on its proposed gasoline-carrying line from Marcus Hook, Pa., to the Ohio River and Lake Erie, which will take over 20,000 tons of 6 or 8-in. material.

Reports from the oil country indicate that some improvement may be expected from that quarter before the end of the year, but present conditions in Texas and Oklahoma fields are very depressed.

Mills have put into effect quantity discounts on line pipe. For 1000 tons or more five fives are granted; from 500 to 999 tons, four fives; less than 500 tons, three fives.

**Wire Products.**—Second quarter contracts on merchant wire products are coming in slowly, and price resistance is reported from some centers. In the immediate Pittsburgh district, nails are holding at \$2.30 to the jobbing trade, with merchant buyers paying 10c. more. Present shipments of nails are generally at lower

## THE IRON AGE Composite Prices

### Finished Steel

March 18, 1930, 2.312c. a Lb.

One week ago.....	2.312c.
One month ago.....	2.305c.
One year ago.....	2.391c.

Based on steel bars, beams, tank plates, wire, rails, black pipe and black sheets. These products make 87 per cent of the United States output of finished steel.

	High	Low
1930	2.362c., Jan. 7;	2.305c., Jan. 28
1929	2.412c., April 2;	2.362c., Oct. 29
1928	2.391c., Dec. 11;	2.314c., Jan. 3
1927	2.453c., Jan. 4;	2.293c., Oct. 25
1926	2.453c., Jan. 5;	2.403c., May 18
1925	2.560c., Jan. 6;	2.396c., Aug. 18

### Pig Iron

March 18, 1930, \$17.75 a Gross Ton

One week ago.....	\$17.75
One month ago.....	18.00
One year ago.....	18.29

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High	Low
1930	\$18.21, Jan. 7;	\$17.75, Mar. 4
1929	18.71, May 14;	18.21, Dec. 17
1928	18.59, Nov. 27;	17.04, July 24
1927	19.71, Jan. 4;	17.54, Nov. 1
1926	21.54, Jan. 5;	19.46, July 13
1925	22.50, Jan. 13;	18.96, July 7

# Mill Prices of Finished Iron and Steel Products

## Iron and Steel Bars

### Soft Steel

#### Base per Lb.

F.o.b. Pittsburgh mill.....	1.85c.
F.o.b. Chicago.....	1.95c. to 2.00c.
Del'd Philadelphia.....	2.17c. to 2.22c.
Del'd New York.....	2.19c. to 2.24c.
Del'd Cleveland.....	1.85c.
F.o.b. Cleveland.....	1.85c.
F.o.b. Lackawanna.....	2.00c.
F.o.b. Birmingham.....	2.00c.
C.i.f. Pacific ports.....	2.35c.
F.o.b. San Francisco mills.....	2.35c.

### Billet Steel Reinforcing

F.o.b. Pittsburgh mills, 40, 50, 60-ft.....	1.95c.
F.o.b. Pittsburgh mills, cut lengths.....	2.20c.
F.o.b. Birmingham, mill lengths.....	2.00c.

### Rail Steel

F.o.b. mills, east of Chicago dist.....	1.80c. to 1.90c.
F.o.b. Chicago Heights mill.....	1.85c.
Del'd Philadelphia.....	2.12c. to 2.22c.

### Iron

Common iron, f.o.b. Chicago.....	1.95c. to 2.00c.
Refined iron, f.o.b. P'gh mills.....	2.75c.
Common iron, del'd Philadelphia.....	2.12c.
Common iron, del'd New York.....	2.14c.

### Tank Plates

#### Base per Lb.

F.o.b. Pittsburgh mill.....	1.80c. to 1.85c.
F.o.b. Chicago.....	1.95c. to 2.00c.
F.o.b. Birmingham.....	2.00c.
Del'd Cleveland.....	1.99c. to 2.04c.
Del'd Philadelphia.....	2.00c. to 2.05c.
F.o.b. Coatesville.....	1.90c. to 1.95c.
F.o.b. Sparrows Point.....	1.90c. to 1.95c.
F.o.b. Lackawanna.....	1.90c. to 1.95c.
Del'd New York.....	2.07½c. to 2.12½c.
C.i.f. Pacific ports.....	2.20c.

### Structural Shapes

#### Base per Lb.

F.o.b. Pittsburgh mill.....	1.80c. to 1.85c.
F.o.b. Chicago.....	1.95c. to 2.00c.
F.o.b. Birmingham.....	2.00c.
F.o.b. Lackawanna.....	1.90c. to 1.95c.
F.o.b. Bethlehem.....	1.90c. to 1.95c.
Del'd Cleveland.....	2.04c.
Del'd Philadelphia.....	1.81c. to 1.91c.
Del'd New York.....	2.04½c. to 2.09½c.
C.i.f. Pacific Ports.....	2.35c.

### Hot-Rolled Hoops, Bands and Strips

#### Base per Lb.

6 in. and narrower, P'gh.....	1.90c.
Wider than 6 in., P'gh.....	1.80c.
6 in. and narrower, Chicago.....	2.10c.
Wider than 6 in., Chicago.....	2.00c.
Cooperage stock, P'gh.....	2.20c.
Cooperage stock, Chicago.....	2.30c.
 Cold-Finished Steel	
 Base per Lb.	
Bars, f.o.b. Pittsburgh mill.....	2.10c.
Bars, f.o.b. Chicago.....	2.10c.
Bars, Cleveland.....	2.10c.
Bars, Buffalo.....	2.10c.
Shafting, ground, f.o.b. mill.....	*2.45c. to 3.40c.
Strips, P'gh.....	2.55c. to 2.65c.
Strips, Cleveland.....	2.65c. to 2.75c.
Strips, del'd Chicago.....	2.95c.
Strips, Worcester.....	2.80c. to 2.90c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland.....	4.00c.

\*According to size.

### Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

#### To Merchant Trade

#### Base per Keg

Standard wire nails.....	\$2.30
Cement coated nails.....	2.30
Galvanized nails.....	4.30
 Base per Lb.	
Polished staples.....	2.75c.
Galvanized staples.....	3.00c.
Barbed wire, galvanized.....	2.95c.
Annealed fence wire.....	2.45c.
Galvanized wire, No. 9.....	2.90c.
Woven wire fence (per net ton to rear-tailers).....	\$65.00

#### To Manufacturing Trade

Bright hard wire, Nos. 6 to 9 gage.....	2.40c.
Spring wire (Carload lots, f.o.b. Chicago).....	3.50c.
Wire nails.....	\$2.35 to \$2.45 (keg)
Annealed fence wire.....	2.50c. to 2.60c. (lb.)
Bright hard wire to manufacturing trade.....	2.45c.

*Anderson, Ind., mill prices are ordinarily \$1 a ton over Pittsburgh base; Duluth, Minn., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.*

### Cut Nails

#### Per 100 Lb.

Carloads, Wheeling, Reading or Northumberland, Pa.....	\$2.55 to \$2.60
Less carloads, Wheeling or Reading.....	2.70

## Light Plates

No. 10, blue annealed, f.o.b. P'gh.....	2.10c.
No. 10, blue annealed, f.o.b. Chicago dist.....	2.20c.
No. 10, blue annealed, del'd Phila.....	2.42c.
No. 10, blue annealed, B'ham.....	2.25c.

## Sheets

### Blue Annealed

#### Base per Lb.

No. 13, f.o.b. P'gh.....	2.25c.
No. 13, f.o.b. Chicago dist.....	2.35c.
No. 13, del'd Philadelphia.....	2.57c.
No. 13, blue annealed, B'ham.....	2.50c.

### Continuous Mill Sheets

No. 10 gage, f.o.b. P'gh.....	1.80c. to 1.90c.
No. 13 gage, f.o.b. P'gh.....	1.95c. to 2.05c.

(Usual range 24 in. to 48 in. wide.)

### Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh.....	2.65c. to 2.75c.
No. 24, f.o.b. Chicago dist. mill.....	2.75c. to 2.85c.
No. 24, del'd Philadelphia.....	2.97c.
No. 24, f.o.b. Birmingham.....	2.90c.

### Metal Furniture Sheets

No. 24, f.o.b. P'gh.....	3.90c. to 4.00c.
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### Galvanized

No. 24, f.o.b. Pittsburgh.....	3.30c. to 3.40c.
No. 24, f.o.b. Chicago dist. mill.....	3.40c. to 3.50c.
No. 24, del'd Cleveland.....	3.49c. to 3.59c.
No. 24, del'd Philadelphia.....	3.62c. to 3.72c.
No. 24, f.o.b. Birmingham.....	3.45c. to 3.50c.

### Tin Plate

#### (F.o.b. Morgantown or Pittsburgh)

#### (Per Package, 20 x 28 in.)

8-lb. coating I.C. \$10.70	25-lb. coating I.C. \$15.90
15-lb. coating I.C. 13.40	30-lb. coating I.C. 16.80
20-lb. coating I.C. 14.60	40-lb. coating I.C. 18.80

### Alloy Steel Bars

#### (F.o.b. makers' mill)

#### Alloy Quantity Bar Base, 2.65c. per Lb.

#### S.A.E. Series

#### Numbers

#### Alloy

#### Differential

2000 (1½% Nickel)	\$0.25
2100 (1½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	0.20
6100 Chromium Vanadium Bars	1.20
6100 Chromium Vanadium Spring Steel	0.95
9250 Silicon Manganese Spring Steel (flats)	0.25
Rounds and squares	0.50
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot rolled steel bars, forging quality. The differential for cold-finished alloy steel bars applying for billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

### Rails

#### Per Gross Ton

Standard, f.o.b. mill.....	\$43.00
Light (from billets), f.o.b. mill.....	36.00
Light (from rail steel), f.o.b. mill.....	34.00
Light (from billets), f.o.b. Ch'go mill.....	36.00

### Track Equipment

#### Base per 100 Lb.

Spikes, ½ in. and larger.....</td
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figures. Bright hard wire and spring wire are better maintained with regard to price, although occasional irregularities have crept out in the Detroit territory. Demand for manufacturers' wire is fairly good.

**Sheets.**—Slightly heavier specifications from the automobile industry, as well as from makers of steel barrels and drums, have given the sheet market a slightly more favorable turn in the last week. Electric refrigerator manufacturers are also increasing their production, and stove and range producers are taking shipments at a somewhat better rate. The radio industry is still badly depressed, and railroad car builders have not reached the point in their schedules which would call for heavy sheet tonnage. Some additional activity is reported among the makers of building materials, but they are somewhat later than usual this year in ordering their requirements.

Reports of improved sales by automobile dealers in the last few days have given the motor car industry a somewhat brighter outlook, but makers seem determined to keep production closely regulated to ultimate demand, and, if this policy is rigidly adhered to, it will be some time before enough surplus cars have been removed from the market to justify any great improvement in production.

Sheet prices are again irregular, and the efforts of some independent makers to advance quotations on black and galvanized material for second quarter are not meeting with universal success. At least two important producers have not yet committed themselves as to second quarter prices, and are not likely to take any action toward an advance. Extremely low quotations in some districts have given the market a weaker undertone, and have also resulted in additional caution

on the part of buyers. Although such contracts have been made only by very large consumers who ordinarily receive some concessions from the quoted levels, they do not indicate that mills are adhering very rigidly to their prospective price schedules.

Operations are improved at some points, but are rather low in the Valleys, and the industry as a whole is not running at more than 70 per cent of capacity.

**Tin Plate.**—Production is steadily increasing as the canning season approaches, and the industry is now running at approximately 85 per cent of practical capacity. Some of the larger independents are running full, and the leading interest is between 80 and 85 per cent. May specifications, which were due on March 15, are coming in at a good rate, but many mills have not yet completed their April quotas. Backlogs are not large, but producers are able to schedule their operations 10 days to two weeks ahead.

**Strip Steel.**—Demand for strip steel is spotty, and in the aggregate is considerably behind the corresponding February period. While specifications for hot-rolled material averaged 60 to 65 per cent last month, they have not been above 50 per cent thus far in March and the decline in cold-rolled tonnage has been equally marked. A few mills catering to certain large automotive accounts have been able to maintain production fairly well, but other makers have not been so fortunate.

Second quarter contracting is proceeding slowly and at the expense of prices in some cases, notably on cold-rolled material. The 2.65c., Pittsburgh or Cleveland, price on this product now applied generally only on small lots, with 2.55c. applying on any substantial tonnages. Hot-rolled strip is holding somewhat better, with 1.80c., Pittsburgh, still applicable on the wider sizes, and 1.90c. on the narrower widths. Price shading has occurred, but is by no means general in this district.

**Cold-Finished Steel Bars.**—Demand continues steady, but in unimpressive volume. General consuming lines are holding up fairly well and any substantial increase in automotive requirements would be reflected immediately in the activities of the cold-finished industry. The price is generally well established at 2.10c., Pittsburgh.

**Coal and Coke.**—Demand for furnace coke is listless, with the \$2.60, Connellsville, price holding on small lot transactions. Steel companies have had little reason to purchase material in the open market for blast furnace operation in order to supplement their own production, and coke makers have little backlog business. Foundry coke is moving in about the same volume which has prevailed for several weeks, with prices none too strong. The season's activity in heating coke is just

about ended. The coal market is slightly more active with the approach of the opening of Lake navigation, but prices are low and generally irregular.

**Old Material.**—The scrap market lacks strength in the absence of any substantial mill buying, with the exception of the monthly Pennsylvania list which was sold during the week. Although prices on the No. 1 heavy melting steel in this list are said to have ranged as high as \$17.10, it is stated that most of the steel went to a nearby mill at less than \$17, probably as low as \$16.85. A small mill purchase from a dealer during the week brought \$16.75, and this undoubtedly represents the top of the market today.

The trend is definitely downward. Mills are restricting shipments at some points and inspection is very severe at others.

*Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:*

Basic Open-Hearth Grades:		
No. 1 heavy melting steel	\$16.25	to \$16.75
No. 2 heavy melting steel	14.50	to 15.00
Scrap rails	15.50	to 16.00
Compressed sheet steel	15.75	to 16.25
Bundled sheets, sides and ends	14.00	to 14.50
Cast iron carwheels	14.50	to 15.00
Sheet bar crops, ordinary	18.00	to 18.50
Heavy breakable cast	12.00	to 13.00
No. 2 railroad wrought	16.25	to 16.75
Hvy. steel axle turnings	14.00	to 14.50
Machine shop turnings	11.00	to 11.50

Acid Open-Hearth Grades:		
Railr. knuckles and couplers	20.50	to 21.50
Railr. coil and leaf springs	20.50	to 21.50
Rolled steel wheels	20.50	to 21.50
Low phos. billet and bloom ends	21.50	to 22.50
Low phos. mill plates	20.50	to 21.50
Low phos. light grades	20.50	to 21.50
Low phos. sheet bar crops	21.00	to 22.00
Heavy steel axle turnings	14.00	to 14.50

Electric Furnace Grades:		
Low phos. punchings	19.50	to 20.00
Hvy. steel axle turnings	14.00	to 14.50

Blast Furnace Grades:		
Short shoveling steel turnings	11.50	to 12.00
Short mixed borings and turnings	11.00	to 11.50
Cast iron borings	11.00	to 11.50

Rolling Mill Grades:		
Steel car axles	20.50	to 21.50
Cupola Grades:		
No. 1 cast	14.00	to 15.00
Rails 3 ft. and under	18.50	to 19.50

## American Firm to Build Russian Steel Plant

A large steel plant and blast furnaces will be erected in Russia by the Soviet Government under American supervision. Contract for the engineering and for supervising the construction has been awarded to Arthur G. McKee & Co., Cleveland, who will also assist in purchasing the equipment. The plant will be a few miles from extensive iron ore properties, which will be developed.

The plant, according to announced plans will include eight 1000-ton blast furnaces, 14 open-hearth furnaces, Bessemer converters and semi-finishing mills. About one half of the output will be in steel rails and the remainder in structural shapes and bars. The annual capacity is placed at 2,500,000 tons of pig iron and 2,500,000 tons of finished steel.

### Warehouse Prices, f.o.b. Pittsburgh

	Base per Lb.
Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes	2.80c. to 2.90c.
Reinforcing steel bars	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons	3.60c.
Squares and flats	4.10c.
Bands	3.25c.
Hoops	4.25c.
Black sheets (No. 24), 25 or more bundles	3.60c.
Galv. sheets (No. 24), 25 or more bundles	4.25c.
Light plates, blue annealed (No. 10), 1 to 24 plates	3.25c.
Blue annealed sheets (No. 13), 1 to 24 sheets	3.40c.
Galv. corrug. sheets (No. 28), per square	4.13c.
Spikes, large	3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count, 60 per cent off list	
Machine bolts, 100 count, 60 per cent off list	
Carriage bolts, 100 count, 60 per cent off list	
Nuts, all styles, 100 count, 60 per cent off list	
Large rivets, base per 100 lb.	\$3.50
Wire, black, soft ann'd, base per 100 lb.	\$2.75 to 2.85
Wire, galv. soft, base per 100 lb.	3.20 to 3.30
Common wire nails, per keg	2.60 to 2.75
Cement coated nails, per keg	2.65 to 2.80

# Semi-Finished Steel, Raw Materials, Bolts and Rivets

## Mill Prices of Semi-Finished Steel

### Billets and Blooms

Per Gross Ton

Rerolling, 4-in. and under 10-in. Pittsburgh	\$33.00
Rerolling, 4-in. and under 10-in., Youngstown	33.00
Rerolling, 4-in. and under 10-in., Cleveland	33.00
Rerolling, 4-in. and under 10-in., Chicago	34.00
Forging quality, Pittsburgh	38.00

### Sheet Bars

(Open Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	\$33.00
Youngstown	\$33.00
Cleveland	\$33.00

### Skelp

(F.o.b. Pittsburgh or Youngstown)

Per Lb.

Grooved	1.85c. to 1.90c.
Universal	1.85c. to 1.90c.
Sheared	1.85c. to 1.90c.

### Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

Per Gross Ton

	Per Gross Ton
Pittsburgh	\$33.00
Youngstown	\$33.00
Cleveland	\$33.00

### Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	\$38.00
Cleveland	38.00
Chicago	39.00

## Prices of Raw Material

### Ores

#### Lake Superior Ores, Delivered Lower Lake Ports

Per Gross Ton

Old range Bessemer, 51.50% iron.	\$4.80
Old range non-Bessemer, 51.50% iron.	4.65
Mesabi Bessemer, 51.50% iron.	4.65
Mesabi non-Bessemer, 51.50% iron.	4.50
High phosphorus, 51.50% iron.	4.40
Foreign Ore, c.i.f. Philadelphia or Baltimore	
Per Unit	
Iron ore, low phos. copper free, 55 to 58% iron in dry Spanish or Algerian.	12.00c.
Iron ore, low phos. Swedish, average 68% iron	12.00c.
Iron ore, basic Swedish, average 65% iron	10.00c.
Manganese ore, washed 52% manganese, from the Caucasus	30.00c.
Manganese ore, Brazilian, African or Indian, basic 50%	30.00c.
Tungsten ore, high grade, per unit, in 60% concentrates	\$15.00 to \$16.00
Per Gross Ton	
Chrome ore, 45 to 50% Cr <sub>2</sub> O <sub>3</sub> , crude, c.i.f. Atlantic seaboard	\$22.00 to \$24.00
Per Lb.	
Molybdenum ore, 85% concentrates of MoS <sub>2</sub> , delivered	.50c. to .55c.

### Coke

Per Net Ton

Furnace f.o.b. Connellsville prompt	\$2.60
Foundry, f.o.b. Connellsville prompt	\$3.50 to 4.75
Foundry, by-product, Ch'go ovens	8.00
Foundry, by-product, New England, del'd	11.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40
Foundry, by-product, Phila.	9.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry by-prod., del'd St. Louis	9.00

### Coal

Per Net Ton

Mine run steam coal, f.o.b. W. Pa. mines	\$1.25 to \$1.75
Mine run coking coal, f.o.b. W. Pa. mines	1.50 to 1.75
Gas coal, ¾-in. f.o.b. Pa. mines	1.90 to 2.00
Mine run gas coal, f.o.b. Pa. mines	1.65 to 1.75
Steam slack, f.o.b. W. Pa. mines	80c. to 90c.
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.10

### Ferromanganese

Per Gross Ton

Domestic, 80%, seaboard	\$94.00 to \$99.00
Foreign, 80%, Atlantic or Gulf port, duty paid	94.00 to 99.00

### Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	\$31.00 to \$34.00
Domestic, 16 to 19%	29.00 to 32.00

### Electric Ferrosilicon

Per Gross Ton Delivered

50%	\$83.50
75%	130.00

Per Gross Ton Furnace

10%	\$35.00
11%	37.00

Per Gross Ton Furnace

10%	12%	\$39.00
11%	14 to 16%	45.00

### Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton

10%	12%	\$34.00
11%	12%	32.00

### Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton

6%	22.00 to 23.00
7%	23.00 to 24.00
8%	24.00 to 25.00
9%	25.00 to 26.00

Per Gross Ton

10%	26.00 to 28.00
11%	28.00 to 30.00
12%	30.00 to 32.00
13%	32.00 to 34.00

Per Gross Ton

10%	26.00 to 28.00
11%	28.00 to 30.00
12%	30.00 to 32.00
13%	32.00 to 34.00

Per Gross Ton

10%	26.00 to 28.00
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12%	30.00 to 32.00
13%	32.00 to 34.00

Per Gross Ton

10%	26.00 to 28.00
11%	28.00 to 30.00
12%	30.00 to 32.00
13%	32.00 to 34.00

Per Gross Ton

10%	26.00 to 28.00

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# Chicago

## Steel Specifications and New Orders Balance Shipments and Ingot Output Remains at 95 Per Cent

**C**HICAGO, March 18.—Encouraging features of the Western iron and steel market are the balance between specifications and current shipments and a substantial undercurrent of new buying. The situation is such that backlog show little variation and ingot output remains at close to 95 per cent of capacity.

The farm implement manufacturing group is in heavy production on tillage machinery and tractors, while builders of road machinery are well booked as a result of unusually large road construction programs that are under way in the Middle West.

The building industry, which has been a weak spot in demand for steel, gives definite signs of betterment, with awards this week at 7500 tons and fresh inquiries for not less than 4500 tons. The Illinois Steel Co.'s expansion program, which calls for about 45,000 tons of steel, is making satisfactory progress, and several sizable awards are expected near the end of the month by Chicago and Milwaukee fabricators.

Demand for steel for buildings and for automobile manufacture are the two low spots in the Western market. Although construction programs are larger, there seems to be little in sight in the immediate future from manufacturers of automobiles. Those who had set March 15 as the time when a turn for the better might have been expected are hesitant to venture a forecast beyond the expression that some improvement should follow open spring weather.

Orders for steel for oil storage tanks continue to play an important part in this market, as do new line pipe orders, which this week call for 250 miles, 190 miles to the A. O. Smith Corporation and 60 miles to the Steel Corporation.

**Pig Iron.**—Efforts are being made by producers of charcoal iron to set their houses in order after the drastic cuts of more than \$4 a ton in the last 10 days. The Southern iron market is quiet, with occasional small lots moving at \$13 a ton, Birmingham. Prices of Northern foundry iron appear to be steady at \$19.50 a ton, local furnace. Some dock iron is still available in Chicago, and is said to be moving at 50c. to \$1 a ton below the general market. Forward contracting is proceeding slowly, while spot purchases are more numerous. In all probability this market is more spotty than a week ago, although shipments reflect a gradual increase in melt. Gaged by shipping schedules, March will prove to be a heavier month than February.

*Prices per gross ton at Chicago:*

N'th'n No. 2 fdy., sil. 1.75 to 2.25..	\$19.50
N'th'n No. 1 fdy., sil. 2.25 to 2.75..	20.00
Malleable, not over 2.25 sil.....	19.50
High phosphorus .....	19.50
Lake Super. charc'l, sil. 1.50..\$23.04 to 27.04	
S'th'n No. 2 fdy. (all rail).....	19.01
Low phosph., sil. 1 to 2, copper free..	29.50
Silvery, sil. 8 per cent....\$28.79 to 29.79	
Bess. ferrosilicon, 14-15 per cent...	46.29

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

**Ferroalloys.**—The feature of this market is the relatively heavy rate of specifying by Western mills. New

purchases are extremely few in number and sales are of small size.

**Bolts, Nuts and Rivets.**—Little resistance to contracts has been offered by users. Current specifications match closely with shipments, which represent output of about 70 per cent of capacity. Releases by automobile manufacturers are light, but specifications from the farm implement trade reflect steady operations. Statements of needs by users indicate small stocks on hand.

**Sheets.**—The price structure in this market remains as it was a week ago. Consumer interest is taking the course that it has followed for many months, namely, placing tonnages for nearby consumption. Sellers had expected that the spring trade would bring a heavier demand than is now in evidence and they therefore lack this factor as a backing for higher prices. Several Ohio producers have opened books for second quarter in Chicago at the top of the quoted spreads.

New business this week is fully equal to shipments, which measure up to 80 per cent of local hot mill capacity. The jobbing trade is enjoying an active early spring business. Barrel and container manufacturers find the outlook more promising. The roofing trade reports business near normal for this time of the year. Jobbing mills have added sizable tonnages to books for material which is to be placed on new cars recently ordered by the Chesapeake & Ohio.

*Base prices per lb., deliv'd from mill in Chicago:* No. 24 black sheets, 2.80c. to 2.90c.; No. 24 galv., 3.45c. to 3.55c.; No. 10 blue ann'l'd, 2.25c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

**Cast Iron Pipe.**—Demand for this commodity is growing in most parts of the country. In Chicago and the immediate vicinity interest is lagging owing to the dullness in local improvement work and the fact that the opening of new subdivisions in recent years was undertaken at a faster rate than the market for real estate justified. Prices remain steady at \$37 to

\$38 a ton, Birmingham, for 6-in. and larger diameters.

Outstanding among awards this week was 8000 tons of 30 and 36-in. pipe by Kansas City, Mo., to the National Cast Iron Pipe Co. and the United States Pipe & Foundry Co. Other new business follows: Duluth, Minn., 700 tons of 4 to 12-in. pipe to American Cast Iron Pipe Co.; Oberlin, Ohio, 100 tons of 4 to 12-in. pipe to an unnamed bidder; Canton, Ohio, 2000 ft. of 4-in., 10,000 ft. of 6-in., 1000 ft. of 8-in. and 1000 ft. of 12-in. pipe to the United States Pipe & Foundry Co.; Ridgeway, Iowa, 150 tons of 2 to 6-in. pipe to McWane Cast Iron Pipe Co.; Rockford, Ill., 600 tons 4 to 24-in. pipe to United States Pipe & Foundry Co.

Fresh inquiries by municipalities are promising. Galesburg, Ill., is in the market for 500 tons for a sewage disposal plant. Muskegon, Mich., will open bids March 21 on 6000 ft. of 6-in. and 2000 ft. of 12-in., and Gordon, Neb., will receive tenders April 3 on 150 tons of 4 and 6-in. Randolph, Iowa, will open bids March 28 on 2700 ft. of 6-in., 1900 ft. of 4-in., 600 ft. of 4-in., 100 ft. of 8-in. and 100 hydrants.

*Prices per net ton, deliv'd Chicago:* Water pipe, 6-in. and over, \$45.20 to \$46.20; 4-in., \$48.20 to \$49.20; Class A and gas pipe, \$3 extra.

**Rails and Track Supplies.**—The standard-section rail market is quiet as to new orders. Operations remain at capacity, with pressure for delivery taxing the ability of local mills. Although shipping schedules were arranged well in advance of track laying needs, they have proved to be somewhat inadequate in view of the open spring weather now prevailing in many parts of the country. New orders for track supplies are widely scattered and light in aggregate tonnage. Fresh business for light rails is confined to a few carlots.

*Prices f.o.b. mill, per gross ton:* Standard section open-hearth and Bessemer rails, \$43; light rails, rolled from billets, \$36. *Per lb.:* Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.07 1/2c. to 2.15c.; angle bars, 2.75c.

**Reinforcing Bars.**—This market gives more promise than at any time this year. A manufacturing plant in Chicago will take over 500 tons and sizable lots will be used in Chicago public improvements and school buildings and for a sewage disposal plant at Galesburg, Ill. Fresh inquiries in a wide range of tonnages are more numerous and estimating bureaus are busy.

Concurrent with the appearance of a more active market comes keen competition for tonnage. Backlogs at most shops are down to the bone and operations are being carried on with reduced hours and small forces. Prices are widely variable, present quotations being nominal. It is reported that several sellers have withdrawn prices which were published a few weeks ago. This is taken by some as the first move to throw the market wide open to extreme competition, with prices the governing factor.

**Wire Products.** — Open spring weather has not brought revival to the jobbing trade as had been expected by producers. However, there has been some improvement in the last week in the merchant trade and fence products. Orders from the manufacturing trade are still without the important support of automobile manufacturers, who are holding output at a level conforming with sales from showroom floors.

Although second quarter quotations have been out for over a week, there is little filling of order books for the coming quarter. In fact, most sellers report that second quarter inquiry is the slowest in several years. Consumers are content to keep small stocks on hand and to depend on prompt mill shipments. Prices for wire and wire products are steady in most of the territory served by Western mills.

**Cold-Rolled Strip.** — This market continues to drag, with no improvement in the rate of operations. Small interest is shown in second quarter needs. Quotations are 2.65c. a lb., Cleveland.

**Bars.** — Chicago producers of soft steel bars are exerting a strong effort to hold the market at a minimum of 1.95c., Chicago, in the face of reports that sales in special instances have been made at 1.90c. It is stated that most of the current orders are at the higher figure.

Deliveries, which range from two to five weeks, indicate that mill schedules are not well balanced, but new buying is in fair volume and specifications are fully equal to shipments. Demand for forging bars is spotty because of the character of the automobile business. Road machinery manufacturers are engaged at near capacity with well-filled order books. One builder is said to be booked to the end of the year.

The alloy bar market is marking time as it awaits improvement in demand from the automobile trade. The rail steel bar market is experiencing a

dull spell, which is uncommon at this time of the year.

**Plates.** — Concessions of \$1 a ton have been made, but most of the current transactions are still at 1.95c. to 2c. a lb., Chicago.

Car tonnages being released by shops are still impressive, and in some instances specifications for car materials for orders on shop books will be reaching local mills as late as mid-summer.

The A. O. Smith Corporation has taken an order for 192 miles of welded pipe for the Pure Oil Co.; also eight 10 x 40-ft. vessels for the Texas Co. and 12 vessels of various sizes for the Empire Refining Co. A local shop will fabricate 4000 tons of tanks for the Empire Refining Co. Miscellaneous orders for tanks call for about 1500 tons of steel. It is reported that a new large gas line project is developing. Quiet inquiries are being made for plates of the size that will be used for 20-in. pipe.

**Structural Material.** — The tone of this market is measurably improved both in inquiries and in orders. Competition is severe, especially in and near Chicago, where the improvement is not so marked as in surrounding territory.

Although there is some weakness in prices for structural material, the market is still quoatable at 1.95c. to 2c. a lb., Chicago.

**Coke.** — This market remains steady at \$8 a ton, f.o.b. local furnace. Shipments reflect a steady melt of pig iron in this district.

**Old Material.** — This market, instead of receding as it gave indication of doing a week ago, now appears to be marking time. Consumer interest is not of a high order except in the matter of shipments against old commitments. Short selling has been common in recent weeks and dealers seem to be having some difficulty in filling these orders. This is a stabilizing factor so far as prices are concerned. In fact, the situation is acute enough in some grades to force brokers to raise bids.

The last sale of heavy melting steel brought \$13.75 a gross ton, delivered. While in the last week or 10 days there has been some talk of offering users this grade at \$13.50, no sales are reported at this figure. Small users continue to take only small lots for immediate consumption and to press for shipments when they lag.

Heavy tonnage users are taking large shipments of heavy melting steel, but in recent days the use of cast iron borings has been cut and acceptances are smaller. A large consumer is reported to have made an offer of \$10 a gross ton, delivered, for borings. This reflects a somewhat more stable tone than had been expected by sellers, who had looked for offers at least 25c. a ton lower than the above figure.

Hydraulic compressed bundles of both dealers' and manufacturers' grades are moving in ample quantities

to meet current needs of users. Demand for malleable grades is moderately active, and incoming shipments are falling short of the needs of buyers.

#### Prices deliv'd Chicago district consumers:

##### Per Gross Ton

###### Basic Open-Hearth Grades :

Heavy melting steel.....	\$13.25 to \$13.75
Shoveling steel.....	13.25 to 13.75
Frogs, switches and guards, cut apart, and misc. rails	14.00 to 14.50
Hydraul. compressed sheets	12.00 to 12.50
Drop forge flashings.....	9.75 to 10.25
No. 1 busheling.....	11.00 to 11.50
Forge'd cast and r'l'd steel carwheels.....	17.50 to 18.00
Railroad tires, charg. box size.....	17.50 to 18.00
Railroad leaf springs cut apart.....	17.50 to 18.00

###### Acid Open-Hearth Grades :

Steel couplers and knuckles	16.00 to 16.50
Coil springs .....	18.00 to 18.50

###### Electric Furnace Grades :

Axle turnings .....	12.50 to 13.00
Low phos. punchings.....	15.25 to 15.75
Low. phos. plates, 12 in. and under .....	15.00 to 15.50

###### Blast Furnace Grades :

Axle turnings .....	10.50 to 11.00
Cast iron borings .....	9.50 to 10.00
Short shoveling turnings..	9.50 to 10.00
Machine shop turnings....	7.50 to 8.00

###### Rolling Mill Grades :

Iron rails .....	14.00 to 14.50
Rerolling rails .....	15.00 to 15.50

###### Cupola Grades :

Steel rails less than 3 ft..	16.50 to 17.00
Steel rails less than 2 ft..	18.00 to 18.50
Angle bars, steel.....	15.25 to 15.75
Cast iron carwheels.....	14.50 to 15.00

###### Malleable Grades :

Railroad .....	16.75 to 17.25
Agricultural .....	15.00 to 15.50

###### Miscellaneous :

*Relaying rails, 56 to 60 lb.	23.00 to 25.00
*Relaying rails, 65 lb. and heav. .....	26.00 to 31.00

###### Per Net Ton

###### Rolling Mill Grades :

Iron angle and splice bars	14.50 to 15.00
Iron arch bars and trans- oms .....	16.50 to 17.00
Iron car axles .....	25.00 to 25.50
Steel car axles .....	16.00 to 16.50
No. 1 railroad wrought..	12.25 to 12.75
No. 2 railroad wrought..	11.75 to 12.25
No. 1 busheling.....	9.00 to 9.50
No. 2 busheling.....	7.25 to 7.75
Locomotive tires, smooth..	14.50 to 15.00
Pipes and flues .....	9.25 to 9.75

###### Cupola Grades :

No. 1 machinery cast.....	13.75 to 14.25
No. 1 railroad cast.....	13.25 to 13.75
No. 1 agricultural cast....	11.75 to 12.25
Stove plate .....	11.00 to 11.50
Grate bars .....	11.00 to 11.50
Brake shoes .....	11.00 to 11.50

\*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

## Malleable Castings Output Up in February

WASHINGTON, March 18.—Rising to 60,723 tons, orders for malleable castings in February were the highest since last October, with a total of 61,164 tons, and may be compared with 57,801 tons in January, based on reports received by the Department of Commerce from producers. These figures are based on actual reports from 99 firms with a capacity of 82,468 tons. Orders booked in February of last year totaled 77,976 tons.

Production in February totaled 66,024 tons, the highest for any month since August of last year, with an output of 69,173 tons. Production in January was 61,145 tons and in February of last year it was 73,875. The rate of operation in February was 67.4 per cent of capacity, against 61.2 per cent in January.

### Warehouse Prices, f.o.b. Chicago

Base per Lb.	
Plates and structural shapes.....	3.10c.
Soft steel bars .....	3.00c.
Reinforc'g bars, billet steel—	
Under 5 tons .....	2.85c.
5 tons to 30 tons .....	2.45c.
30 tons and over.....	2.00c.
Rail steel reinforcement.....	1.75c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	3.60c.
Flats and squares .....	4.10c.
Bands ( $\frac{1}{2}$ in. in Nos. 10 and 12 gages) .....	3.20c.
Hoops (No. 14 gage and lighter) .....	3.75c.
Black sheets (No. 24) .....	4.05c.
Galv. sheets (No. 24) .....	4.60c.
Blue ann'l'd sheets (No. 10) .....	3.35c.
Spikes, $\frac{1}{2}$ in. and larger .....	3.55c.
Track bolts .....	4.55c.
Rivets, structural .....	4.00c.
Rivets, boiler .....	4.00c.
Per Cent Off List	
Machine bolts .....	60
Carriage bolts .....	60
Coach or lag screws .....	60
Hot-pressed nuts, sq., tap. or blank..	60
No. 8 black ann'l'd wire, per 100 lb. ....	\$3.45
Com. wire nails, base per keg. \$2.85 to 2.95 keg .....	2.85 to 2.95

# New York

## Pig Iron Sales Increase But Steel Demand Shows No Seasonal Expansion—Prices No Stronger

**N**EW YORK, March 18.—Pig iron sales have shown a further increase, having totaled 13,000 tons last week, compared with 10,000 tons in the previous week. There was a continuation of active buying in the first two days of the current week, when more than 4000 tons was sold. Many melters have bought conservatively for delivery through the second quarter. Others, who will carry over considerable iron into next quarter, are not in the market. Low prices evidently played their part in bringing out recent buying, but furnaces that have built up fair backlogs are reported to be taking a stronger price position.

A leading Buffalo interest has announced that its minimum base price is now \$16.50, furnace. However the market is not yet free from quotations as low as \$16, Buffalo, or the equivalent on a delivered basis. Alabama foundry iron is still a competitive factor.

A single sale of 2000 tons of Southern iron is reported. Among the largest transactions of the week was the placing of 3000 tons by the Burden Iron Co., Troy, N. Y.

*Prices per gross ton, delivered New York district:*

Buffalo No. 2 fdy., sll. 1.75 to 2.25	\$20.91 to \$21.41
*Buff. No. 2, del'd east. N. J.	19.28 to 19.78
East. Pa. No. 2 fdy., sll. 1.75 to 2.25	19.39 to 21.02
East. Pa. No. 2X fdy., sll. 2.25 to 2.75	19.89 to 21.52

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.

\*Prices delivered to New Jersey cities having rate of \$3.28 a ton from Buffalo.

**Warehouse Business.**—A slight increase in the volume of buying from stock has developed in the past week, but individual orders are still rather small. Structural steel buying is decidedly limited, although this is the usual season for an increase in tonnage. Most of the present purchases from stock are for general maintenance and repair work on buildings. Sheets are inactive and prices subject to shading, especially on galvanized.

**Cast Iron Pipe.**—Although demand for pressure pipe is still small, prices are strong, with a decided upward trend. The recent opening of bids by the Department of Purchase, New York, on about 9000 tons of pipe to be cement lined and piled in city storage yards brought out prices of \$47.35 and \$47.65 a net ton, delivered. Low bidders were the United States Pipe & Foundry Co., Warren Foundry & Pipe Co. and Donaldson Iron Co. About 3000 tons of 16-in. water pipe for Catskill, N. Y., is reported to have been awarded to R. D. Wood & Co. The Kennebec Water District, Waterville, Me., is inquiring for about 200 tons of 8-in. water pipe. A private utility, which buys in New York, is

asking for about 1000 tons of 6, 8 and 12-in. pipe for delivery in Massachusetts.

Effective March 20, freight rates on cast iron pipe are increased from \$9.75 to \$10 a ton from Birmingham to New York and from \$2.60 to \$3 a ton from Northern foundries to New York. Other increases on Southern cast iron pipe are: To Philadelphia, from \$8.05 a ton to \$9.40; to Harrisburg, Pa., from \$7.09 to \$9.20; to Marcus Hook, Pa., from \$6.97 to \$9.40 a net ton.

*Prices per net ton deliv'd New York:* Water pipe, 6-in. and larger, \$39.00 to \$41.00; 4-in. and 5-in., \$42.00 to \$44.00; 3-in., \$49.00 to \$51.00. Class A and gas pipe, \$3 extra.

**Finished Steel.**—A canvass of local steel company sales offices reveals no signs of a March upturn in steel demand. In some instances orders and specifications are being received at about the volume of the last two weeks of February, while in other cases there has been a falling off in business in the past week or 10 days. Plates in particular have experienced a slump. Consumers are cautious in their commitments.

Mills are ready to take second quarter contracts at unchanged prices, but many of the first quarter contracts have not been taken out in full and buyers prefer to extend these contracts, although the unspecified tonnages will not take care of their requirements for more than a month or six weeks. Efforts to obtain higher prices for the second quarter, especially on sheets, are being abandoned, and most of the mills will be content if they can hold present prices. Reports of concessions are heard, but many of the current orders are so small that the inducement for price cutting is lacking.

Mills making line pipe have put into effect a schedule of quantity discounts. For 1000 tons or more five fives are granted; from 500 to 999 tons, four fives, and less than 500 tons, three fives.

*Mill prices per lb., deliv'd New York:* Soft steel bars, 2.19c.; plates, 2.07½c. to 2.12½c.; structural shapes, 2.04½c. to 2.09½c.

**Coke.**—Furnace coke prices are still lacking in strength, so that, although the range of present quotations is \$2.50 to \$2.60 a net ton, Connellsville, distress carloads of standard furnace are obtainable at concessions. Special brands of beehive foundry coke are unchanged at \$4.85 a net ton, ovens, or \$8.56, delivered to northern New Jersey, Jersey City and Newark, and \$9.44 to New York and Brooklyn. By-product foundry coke is quoted at \$9 to \$9.40, Newark or Jersey City; \$10.06, New York or Brooklyn.

**Old Material.**—The recent upward movement in the eastern Pennsylvania

market, which was largely in heavy melting steel, has been followed by a decided downward trend. Brokers, who a week ago were paying \$15 a ton and only occasionally obtaining material at slightly less, have reduced buying prices to \$14.50 a ton, and one consumer in eastern Pennsylvania, who bought at \$15 a ton, delivered, is unwilling to pay more than \$14.50 a ton today. Other grades of scrap show little change in price, with demand

### Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes.....	3.30c.
Soft steel bars, small shapes.....	3.25c.
Iron bars .....	3.24c.
Iron bars, Swed. charcoal .....	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	

Rounds and hexagons.....	3.40c.
Flats and squares.....	3.90c.

Cold-roll. strip, soft and quarter hard .....	5.05c.
Hoops .....	4.25c.
Bands .....	3.75c.
Blue ann'l'd sheets (No. 10) .....	3.60c.
Long terne sheets (No. 24) .....	5.80c.
Standard tool steel .....	12.00c.
Wire, black annealed .....	4.50c.
Wire, galv. annealed .....	5.15c.
Tire steel, $\frac{1}{2}$ in. $\times \frac{1}{2}$ in. and larger .....	3.40c.
Smooth finish, 1 to $2\frac{1}{2}$ x $\frac{1}{4}$ in. and larger .....	3.75c.
Open-hearth spring steel, bases .....	4.50c. to 7.00c.

	Per Cent
Machine bolts, cut threads: Off List	
$\frac{1}{4}$ x 6 in. and smaller .....	60
1 x 30 in. and smaller .....	50 to 50 and 10
Carriage bolts, cut thread:	
$\frac{1}{4}$ x 6 in. and smaller .....	60
$\frac{1}{4}$ x 20 in. and smaller .....	50 to 50 and 10
Coach Screws:	
$\frac{1}{4}$ x 6 in. and smaller .....	60
1 x 6 in. and smaller .....	50 to 50 and 10
Boiler Tubes— Per 100 Ft.	
Lap welded, 2-in .....	\$19.00
Seamless steel, 2-in .....	20.25
Charcoal iron, 2-in .....	26.25
Charcoal iron, 4-in .....	67.00

	Standard Steel	Black	Galv.
$\frac{1}{4}$ -in. butt .....	46	29	
$\frac{3}{8}$ -in. butt .....	51	37	
1- $\frac{1}{2}$ -in. butt .....	53	39	
2- $\frac{1}{2}$ -in. lap .....	48	35	
7 and 8-in. lap .....	44	17	
11 and 12-in. lap .....	37	12	

### Wrought Iron—

$\frac{1}{4}$ -in. butt .....	5	+19
$\frac{3}{8}$ -in. butt .....	11	+ 9
1- $\frac{1}{2}$ -in. butt .....	14	+ 6
2-in. lap .....	5	+14
3-6-in. lap .....	11	+ 6
7-12-in. lap .....	3	+16

### Tin Plate (14 x 20 in.)

	Prime	Seconds
Coke, 100 lb. base box .....	\$6.45	\$6.20
Charcoal, per Box—	A	AAA
IC .....	\$9.70	\$12.10
IX .....	12.00	14.25
IXX .....	13.90	16.00

### Terne Plate (14 x 20 in.)

IC—20-lb. coating .....	\$10.00 to \$11.00
IC—30-lb. coating .....	12.00 to 13.00
IC—40-lb. coating .....	13.75 to 14.25

### Sheets, Box Annealed—Black, C. R. One Pass

	Per Lb.
Nos. 18 to 20 .....	3.60c. to 3.70c.
No. 22 .....	3.75c. to 3.85c.
No. 24 .....	3.80c. to 3.90c.
No. 26 .....	3.90c. to 4.00c.
No. 28* .....	4.05c. to 4.15c.
No. 30 .....	4.30c. to 4.40c.

### Sheets, Galvanized

No. 14 .....	3.90c. to 4.00c.
No. 16 .....	3.75c. to 3.85c.
No. 18 .....	3.90c. to 4.00c.
No. 20 .....	4.00c. to 4.10c.
No. 22 .....	4.10c. to 4.20c.
No. 24† .....	4.25c. to 4.35c.
No. 26 .....	4.50c. to 4.60c.
No. 28* .....	4.75c. to 4.85c.
No. 30 .....	5.15c. to 5.25c.

\*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

†For 50 bundles or more, 25c. per 100 lb. or less.

light. Blast furnace scrap is being bought at \$10 a ton, delivered to Bethlehem and Swedeland, Pa.

*Dealers' buying prices per gross ton, f.o.b. New York:*

No. 1 heavy melting steel.	\$11.00
Heavy melting steel (yard)	\$7.75 to 8.50
No. 1 hvy. breakable cast.	9.25 to 10.00
Stove plate (steel works).	8.00
Locomotive grate bars.	8.25
Machinist shop turnings.	7.00 to 7.50
Short shoveling turnings.	7.25 to 7.50
Cast borings (blast fur. or steel works).	7.00 to 7.50
Mixed borings and turnings.	6.50 to 7.25
Steel car axles.	16.75 to 17.75
Iron car axles.	20.50 to 21.00
Iron and steel pipe (1 in. dia., not under 2 ft. long).	9.75
Forge fire.	8.50 to 9.00
No. 1 railroad wrought.	11.50 to 12.00

No. 1 yard wrought, long.	10.50 to 11.50
Rails for rolling.	10.50 to 11.00
Stove plate (foundry).	8.75 to 9.00
Malleable cast (railroad).	12.00 to 12.50
Cast borings (chemical).	9.50 to 10.00

*Prices per gross ton, deliv'd local foun-dries:*

No. 1 machry. cast.	\$15.00
No. 1 hvy. cast (columns, bldg. ma-terials, etc.), cupola size.	13.00
No. 2 cast (radiators, cast boilers, etc.)	12.50

**Reinforcing Bars.**—Inquiries for reinforcing bars are in somewhat better volume. The Concrete Steel Co. has booked 7800 tons for a sea wall at Lake Pontchartrain, La. A reservoir at Clifton, N. J., taking 500 tons, was the largest award in the metropolitan district. Prices are unchanged.

## Cleveland

### Automobile Companies Expand Orders Slightly for Bars and Sheets But General Improvement Is Slow

**C**LEVELAND, March 18.—Demand for finished steel showed a slight tendency upward during the week, the improvement in orders largely affecting steel bars and sheets. A few of the automobile manufacturers have placed contracts for steel requirements either for April shipment or the second quarter, but orders from this industry continue light.

Automobile manufacturers, with few exceptions, have decreased production this month and not much improvement is looked for until the spring demand stimulates dealers' sales. The Ford Motor Co. is reported to have made a slight increase in its production schedules and another manufacturer of low-priced cars, which has been following the policy of closely balancing production with sales, has made quite an increase in output. Automobile manufacturers are carrying very low stocks, so that increases in operations should be quickly reflected in larger specifications for steel.

No changes in ingot production by local mills were reported during the week. Finishing mills are operating rather irregularly, with little backlog. Outside of the automotive industry not much interest is being shown at yet in second quarter contracts.

There is little of moment in the price situation other than the decision of producers to sell black sheets to the automotive industry at 2.65c. for the coming quarter. On most products there has not been enough second quarter business placed to test prices.

Sheet shipments by independent mills were in the same volume in February as in January, but production fell off slightly and sales rather sharply as compared with January, according to the monthly report of the National Association of Flat Rolled Steel Manufacturers.

**Pig Iron.**—Sales increased the past week, during which Cleveland interests sold 27,000 tons. There was also a slight improvement in shipping orders. There have been no further suspensions from the automotive industry, which is taking iron at the same rate as during the past two or three weeks, and some other industries are taking shipments a little more freely than recently. Some new business also came out during the week from motor car manufacturers, who have been keeping out of the market pretty generally lately. Sales included a few lots up to 1000 to 2000 tons for the second quarter. However, a large share

of consumers are still buying in small lots either for prompt shipment or for delivery through April. Activity in this immediate territory is extremely limited.

The open Cleveland quotation for outside shipment for foundry and malleable iron is unchanged at \$18.50, furnace, but this must be shaded about 50c. a ton for some competitive points. For Cleveland delivery, the market is firm at \$19, furnace. Valley furnaces are reported to be making concessions to near \$18 to absorb their disadvantage in freight rate for shipment to some northern Ohio points. The Lake furnace price for shipment to Michigan and northern Indiana is about 50c. a ton lower than recent levels. In northern Indiana, the range is now \$18.50 to \$19 and in most sections of Michigan \$19.50 is now generally quoted, as compared with \$20, which has prevailed in the eastern part of the State.

*Prices per gross ton at Cleveland:*

N'th'n fdy., sil. 1.75 to 2.25	\$19.50
S'th'n fdy., sil. 1.75 to 2.25	19.51
Malleable.	19.50
Ohio silvery, 8 per cent.	28.00
Basic Valley furnace.	18.50
Stand. low phos., Valley.	\$26.50 to 27.00

Prices except on basic and low phosphorus are delivered Cleveland. Freight rates: 50c. from local furnaces; \$3 from Jackson, Ohio; \$6.01 from Birmingham.

**Bars, Plates and Shapes.**—Some consumers are beginning to show an interest in second quarter contracts, although no business has as yet been taken for that delivery in this terri-

tory. Most mills have opened their books at 1.85c. for the coming quarter.

Structural inquiry is light. However, a fair amount of work is pending. The Cleveland Union Terminal interests expect to have plans ready about May 1 for a large department store requiring several thousand tons. Plate inquiries have increased, but orders are not plentiful. The Grand Trunk Railroad has an inquiry out for a car ferry requiring 3500 to 4000 tons of steel.

Steel bars are moving a little better than recently. The price is firm in this territory at 1.85c., Cleveland, and for local delivery mills are adding a switching charge of 2.50c. per 100 lb. There are still concessions to 1.80c., Pittsburgh, on plates. The 1.85c. price is holding on most shape business.

**Sheets.**—Although an advance to 2.75c., Pittsburgh, on black sheets for the second quarter was announced by several of the mills, it has been decided to quote 2.65c. to the automotive industry. For other consumers the asking price is 2.75c., but it seems doubtful if the price spread can be maintained.

There has been some contracting for either the coming quarter or for April, largely for automobile body sheets. Specifications from the motor car industry continue light, but orders increased during the week from metal furniture, stove and refrigerator manufacturers and some business came from the railroads.

While instances of shading on auto body sheets are reported, 3.90c. is still quotable in this market. One lot of 400 tons brought that price. Metal furniture sheets are still available at 3.90c., although most mills are asking 4c. for the next quarter. Quoted prices on blue annealed sheets are being maintained. Galvanized sheets are weak. While the common price is 3.30c., this is being shaded \$1 a ton.

**Wire Products.**—Manufacturers' wire is firmer, shading to 2.30c., Cleveland, evidently having disappeared. Nails are irregular. While most mills are holding to \$2.30 per keg, dealers as well as jobbers are able to buy at that price and concessions to \$2.20 to jobbers are reported.

**Warehouse Business.**—Jobbers have adopted quantity differentials on blue annealed sheets, these being the same as announced last week on other hot-rolled mill products.

#### Warehouse Prices, f.o.b. Cleveland

Base per Lb.

Plates and struc. shapes.	3.00c.
Soft steel bars.	3.00c.
Reinfor. steel bars.	2.25c. to 2.50c.
Cold-fin. rounds and hex.	3.65c.
Cold-fin. flats and sq.	4.15c.
Hoops and bands, No. 12 to $\frac{1}{4}$ in. inclusive.	3.25c.
Hoops and bands, No. 13 and lighter.	3.65c.
Cold-finished strip.	*5.95c.
Black sheets (No. 24).	3.75c.
Galvanized sheets (No. 24).	4.50c.
Blue ann'l'd sheets (No. 10).	3.25c.
No. 9 ann'l'd wire, per 100 lb.	\$2.75
No. 9 galv. wire, per 100 lb.	3.20
Com. wire nails, base per keg.	2.65

\*Net base, including boxing and cutting to length.

**Strip Steel.**—Mills report that they have taken some second quarter contracts for hot-rolled strip from automobile manufacturers in the Detroit territory and also in this territory at the ruling quotations of 1.80c., Pittsburgh, for wide and 1.90c. for narrow strip, and these prices appear to be well maintained for current orders. Specifications continue light. Cold-rolled strip is still moving very slowly. While the 2.65c., Cleveland, price does not appear very firm, this is being maintained for the small-lot business that is coming out.

**Coke.**—The demand for foundry coke is spotty. Some consumers have increased shipping orders and others have curtailed. Prices are steady at recent quotations. Ohio by-product coke is quoted at \$8.25, ovens.

**Old Material.**—Shipping orders have been further curtailed by both Cleveland and Valley mills, giving the market a weaker tone. Prices have further declined 25c. to 75c. a ton on most steel-making grades, but are holding fairly steady on blast furnace scrap. Buying is confined to small lots by dealers who made purchases during the week at \$10.50 for machine

shop turnings, \$11 for borings and turnings and \$10.25 for No. 2 busheling. Not a great deal of scrap is coming onto the market as producers are not showing anxiety to sell unless they can ship the material.

*Prices per gross ton delivered consumers' yards:*

**Basic Open-Hearth Grades:**

No. 1 heavy melting steel	\$13.25 to \$13.75
No. 2 heavy melting steel	12.75 to 13.25
Compressed sheet steel	12.75 to 13.00
Light bundled sheet stampings	11.00 to 11.50
Drop forge flashings	11.50 to 11.75
Machine shop turnings	10.00 to 10.50
Short shoveling turnings	11.25 to 11.75
No. 1 railroad wrought	13.00 to 13.50
No. 2 railroad wrought	14.00 to 14.50
No. 1 busheling	12.00 to 12.50
Pipes and flues	9.00 to 9.50
Steel axle turnings	12.50 to 13.00

**Acid Open-Hearth Grades:**

Low phos., forging crops	17.75 to 18.00
Low phos., billet bloom and slab crops	18.50 to 18.75
Low phos., sheet bar crops	18.00 to 18.50
Low phos., plate scrap	18.00 to 18.50

**Blast Furnace Grades:**

Cast iron borings	10.50 to 11.00
Mixed borings and short turnings	10.50 to 11.00
No. 2 busheling	10.00 to 10.25

**Cupola Grades:**

No. 1 cast	15.25 to 15.75
Railroad grate bars	11.00 to 12.00
Stove plate	12.00 to 12.50
Rails under 3 ft	18.50 to 19.50

**Miscellaneous:**

Rails for rolling	16.25 to 16.50
Railroad malleable	16.00 to 16.50

**Bars.**—Demand is limited to small lots, and the quotation is unchanged at 1.85c. a lb., base Pittsburgh, or 2.17c., delivered Philadelphia. A test of the firmness of this price is lacking through absence of sizable orders.

**Shapes.**—Mills are maintaining fair operating rates, in certain instances ranging up to 80 per cent of capacity. Prices, however, for both small and sizable tonnages are close to the level usually considered as the preferred buyers' market. Shapes range from 1.75c. to 1.80c. a lb., f.o.b. nearest mill to consumer, or 1.81c. to 1.86c., delivered Philadelphia, and occasionally 1.85c., mill, or 1.91c. delivered Philadelphia, is quoted on a small lot. Building construction is providing little tonnage at present, but railroad and bridge building requirements are in good volume.

**Plates.**—Quotations are maintained at 1.90c., Coatesville, Pa., or 2c. per lb., delivered Philadelphia, for the smaller tonnages of plates being bought at present. On large, preferred business, such as contracts with shipbuilders, which are expected to buy substantially before long, \$1 to \$2 a ton concessions could probably be obtained. Plate mill operations show a wide range, with certain eastern Pennsylvania mills at about 55 per cent of rated capacity and others at 65 to 70 per cent.

**Sheets.**—Buying is limited, with automobile body manufacturers operating on curtailed schedules and plants which make stampings for the automotive industry practically out of the market at present. Radio manufacturers are buying only small lots of sheets to be used for experimental work. Mills are quoting black sheets for second quarter delivery at 2.75c., Pittsburgh, or 3.07c., delivered Philadelphia, and one eastern Pennsylvania sheet producer has also advanced blue annealed and galvanized sheets \$2 a ton, for delivery in the next quarter. Other mills are still quoting blue annealed sheets, No. 13 gage, at 2.25c.,

## Philadelphia

### Mill Operations Show Wide Range—Shape Prices Lack Strength—Effort to Advance Sheets \$2 a Ton

**P**HILADELPHIA, March 18.—Operating rates of eastern Pennsylvania steel mills have receded further in the past week, now ranging from 55 to 60 per cent at certain plants and from 70 to 80 per cent at others. Although structural steel prices lack strength, shape mills are among the producers with the higher rates of operation.

Black sheets are quoted at 2.75c. a lb., Pittsburgh, for second quarter delivery, a \$2 a ton advance from the prevailing price recently, and one eastern Pennsylvania interest has also made advances of \$2 a ton in quotations on blue annealed and galvanized sheets.

Most sellers in this district are booking as many orders as in periods of considerably greater activity, but the total tonnage is small.

**Reinforcing Bars.**—Most of the current requirements in this district are for lots of considerably less than 100 tons. The Liberty-Lincoln Building in Philadelphia will require about 325 tons. Quotations are 1.90c. to 1.95c. a lb., Pittsburgh, or 2.22c. to 2.27c., delivered Philadelphia, for billet steel bars and 1.75c., Franklin, Pa., and Tonawanda, N. Y., or 2.07c., delivered Philadelphia, for rail steel bars. No extra for cutting to length is charged on rail steel bars, and this extra is usually omitted also by billet steel bar sellers.

**Pig Iron.**—Most eastern Pennsylvania consumers of foundry iron, especially manufacturers of sanitary products, are operating on curtailed schedules. An exception is the cast iron pipe industry, which is increasingly active. A Delaware River pipe plant is understood to have closed on about 15,000 tons of foundry iron with a Birmingham furnace.

Quotations of eastern Pennsylvania

furnaces range from \$19.50 to \$20 a ton, base, for foundry iron, the latter price usually applying only on small lots. Low phosphorus iron continues in moderate demand and the price is well maintained. An eastern Pennsylvania steel company furnace was low bidder on 50 tons of low phosphorus iron for the Panama Canal Commission.

A consumer of basic iron in this district is reported to have closed on a substantial tonnage.

*Prices per gross ton at Philadelphia:*

East. Pa. No. 2, 1.75 to 2.25 sil.	\$20.26 to \$20.76
East. Pa. No. 2X, 2.25 to 2.75 sil.	20.76 to 21.26
East. Pa. No. IX	21.26 to 21.76
Basic (del'd east. Pa.)	19.00 to 19.50
Malleable	21.25 to 21.75
Stand. low phos. (f.o.b. east. Pa. furnace)	24.00
Cop. b'r'g low phos. (f.o.b. furnace)	23.00 to 24.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.29
Va. No. 2X, 2.25 to 2.75 sil.	22.79

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

### Warehouse Prices, f.o.b. Philadelphia

Base per Lb.

Plates, 1/4-in. and heavier	2.70c.
Plates, 1/8-in.	2.90c.
Structural shapes	2.70c.
Soft steel bars, small shapes, iron bars (except bands)	2.80c.
Round-edge iron	3.50c.
Round-edge steel, iron finished 1 1/2 in.	3.50c.
Round-edge steel planished	4.30c.
Reinforc. steel bars, sq. twisted and deform.	2.60c. to 2.80c.
Cold-fin. steel, rounds and hex.	3.40c.
Cold-fin. steel, sq. and flats	3.90c.
Steel hoops	3.55c.
Steel bands, No. 12 to 1/4-in. inclus.	3.30c.
Spring steel	5.00c.
*Black sheets (No. 24)	3.80c.
†Galvanized sheets (No. 24)	4.45c.
Light plates, blue annealed (No. 10)	3.25c.
Blue ann'l'd sheets (No. 13)	3.40c.
Diam. pat. floor plates	
1/4-in.	5.30c.
1/8-in.	5.50c.
Rails	3.20c.
Swedish iron bars	6.60c.

\*For 50 bundles or more; 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.

†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

Pittsburgh, or 2.57c., Philadelphia, and blue annealed plates, No. 10 gage, at 2.10c., Pittsburgh, or 2.42c., Philadelphia. Galvanized sheets are 3.30c. to 3.40c., Pittsburgh, or 3.62c. to 3.72c., delivered Philadelphia.

The present size of sheet orders provides no adequate test of the firmness of prices for the coming quarter, but an inquiry from a local automobile body builder expected shortly may determine the strength of both black and blue annealed sheet quotations.

**Imports.**—In the week ended March 15, 1199 tons of pig iron arrived at this port from British India. Ore arrivals consisted of 3370 tons of chrome ore from Portuguese Africa and 514 tons from British South Africa. Steel imports were 1632 tons of structural shapes, 27 tons of steel bars, 10 tons of steel plates and 33 tons of hoop steel from Belgium, 30 tons of hoop steel from France and 22 tons from the United Kingdom and 20 tons of steel scrap from Canada.

**Old Material.**—Most grades of scrap show a tendency to decline in price. No. 1 heavy melting steel is not quotable today at more than \$15 a ton, delivered. One eastern Pennsylvania mill, which recently closed on a substantial tonnage at this price, is unwilling to consider offers of material at more than \$14.50 a ton, delivered, the present buying price of brokers in

filling contracts. A Phoenixville, Pa., consumer of machine shop turnings has closed on a tonnage at \$11, delivered. Cast borings are quoted at \$11.25 a ton, delivered, for substantial lots, but a small order was recently placed by an eastern Pennsylvania buyer at \$11.50 a ton, delivered. Couplers and knuckles and rolled steel wheels have been sold to a steel foundry in this district at about \$20 a ton, delivered, a slight advance.

*Prices per gross ton delivered consumers' yards, Philadelphia district:*

No. 1 heavy melting steel.	\$15.00
Scrap T rails	14.50
No. 2 heavy melting steel	\$11.50 to 13.00
No. 1 railroad wrought	15.00 to 15.50
Bundled sheets (for steel works)	11.50
Hydraulic compressed, new	13.50
Hydraulic compressed, old	12.00 to 13.00
Machine shop turnings (for steel works)	11.00 to 11.50
Heavy axle turnings (or equiv.)	12.50 to 13.50
Cast borings (for steel works and roll. mill)	11.25 to 11.50
Heavy breakable cast (for steel works)	14.00
Railroad grate bars	11.50 to 12.00
Stove plate (for steel works)	11.50 to 12.00
No. 1 low phos., hvy. 0.04% and under	20.50 to 21.50
Couplers and knuckles	19.50 to 20.00
Rolled steel wheels	19.50 to 20.00
No. 1 blast f'nace scrap	10.50 to 11.00
Wrot. iron and soft steel pipes and tubes (new specific.)	14.00
Shafting	19.00
Steel axles	21.00 to 21.50
No. 1 forge fire	13.00 to 13.50
Cast iron carwheels	15.00
No. 1 cast	15.00 to 15.50
Cast borings (for chem. plant)	14.00
Steel rails for rolling	15.00 to 15.50

The report shows that officials of the Ohio State government are not only pressing forward work in their own departments, but are in close touch with county commissioners, mayors and other local officials, and also are tying in their activities with the setting up of a temporary State committee on employment made up of the presidents and secretaries of nine State-wide organizations of industrial management, agriculture, labor and commerce. This committee in turn has organized 86 separate county committees made up of representatives of labor, manufacturers, retail merchants, bankers, building and loan associations, farm representatives, representatives of chambers of commerce, of newspapers, etc.

## Asks 14 Questions On Sale of Youngstown Company

A challenge to the sponsors of the proposed sale of the Youngstown Sheet & Tube Co. to Bethlehem Steel Corporation (mentioned at length on page 876) is laid down in the form of 14 questions in a statement made public late March 18 by Myron C. Wick, Jr., secretary of the committee of stockholders opposed to the sale of the Youngstown company. "As a stockholder in the Youngstown Sheet & Tube Company," says Mr. Wick, "I have, of course, read with interest the published statements of Messrs. Campbell and Purnell as to the reasons they believe the sale of Sheet & Tube company to Bethlehem Steel Corporation is for the best interest of Sheet & Tube stockholders. I have been very disturbed at the way in which our board of directors, by a divided vote, are trying to push Sheet & Tube into the arms of Bethlehem. I feel that stockholders are entitled to plain answers to certain specific questions as follows": [Below are five of the 14 questions.]

1. Why was a special stockholders' meeting called precipitously for April 8 with the annual meeting only two weeks away?

2. Why should I, as a stockholder, be rushed into becoming a stockholder in a corporation that offers me neither the earnings nor the stable dividends that I looked for and found in Sheet & Tube?

3. Why should I be asked, in addition, to take a loss at the market prices on exchanging my shares? If the Sheet & Tube stock is to be pulled down, I feel I am entitled to have tangible reasons why.

4. Why am I expected to take at its face value the statement that a sale to Bethlehem will stabilize Sheet & Tube's dividends, when I know that Sheet & Tube has an unbroken and rising dividend record of a quarter of a century, while Bethlehem has paid but one dividend in the past five years and only ten out of the past twenty-five years.

5. What has suddenly happened since Chairman Campbell's optimistic statement to stockholders in his annual report of a few weeks ago to make him and President Purnell point to the company's dubious future and its inability to stand on its own feet?

## Highway Program Is Large

### State and Local Authorities Will Spend \$1,600,000,000 on Roads This Year

**WASHINGTON,** March 18.—State and local authorities plan to spend \$1,601,167,455 for highway improvement in 1930, according to reports received by the Bureau of Public Roads, Department of Agriculture, from State highway departments. The amount represents at least \$250,000,000 more than was spent in 1929. The program reflects a gratifying response to President Hoover's plea to enlarge all construction programs as much as is practicable to ameliorate the unemployment situation.

The planned expenditure by State highway departments for construction and maintenance of State highways in 1930 is \$937,500,455. The balance, \$663,667,000, will be spent, according to the estimates, on local roads and bridges. The State highway officials of 45 States estimate the total length of roads to be improved as 32,532 miles, an increase of 3126 miles over the estimate in the 1929 programs. Three States failed to report contemplated mileages for 1930. The highway departments of all States will control the maintenance of 281,393 miles of highway this year, an increase of 32,381 miles over 1929.

The States of greatest population and industrialization, in which un-

employment is naturally the greatest, show the highest contemplated expenditures. The Middle Atlantic States, New York, New Jersey and Pennsylvania, plan to spend \$374,835,310; the East North Central States, Ohio, Indiana, Illinois, Michigan and Wisconsin, \$303,696,000; the West North Central States, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska and Kansas, \$236,461,727; South Atlantic States, Delaware, Maryland, Virginia, West Virginia, North Carolina, South Carolina, Georgia and Florida, \$182,872,418; West South Central States, Arkansas, Louisiana, Oklahoma, and Texas, \$154,100,000.

At the weekly press conference yesterday Secretary of Commerce R. P. Lamont commended State officials generally for their earnest and effective cooperation in expediting the nation's 1930 building operations, which it is estimated will total \$7,000,000,000 for public works and utilities, exclusive of other types, and discussed a letter and detailed report the department has received from Governor Myers Y. Cooper of Ohio, outlining the various steps taken in that State to push its construction plans.

## Pacific Coast

### Steel Buying Not Expanding—Inquiries Slow in Coming Out—Plate Prices Continue Weak

SAN FRANCISCO, March 15 (*By Air Mail*).—Activity in the Pacific Coast steel markets during the past week was exceptionally quiet, and few awards of importance were reported. New inquiries are slow in coming out. Prices are holding fairly well except on plates.

**Pig Iron.**—Foundry operations continue slow and uneven, sales and inquiries for foundry iron being confined to small tonnages for prompt shipment. No change in quotations has occurred recently.

*Prices per gross ton at San Francisco:*  
\*Utah basic ..... \$25.00 to \$26.00  
\*Utah fdy., sil. 2.75 to 3.25 ..... 25.00 to 26.00  
\*\*Indian fdy., sil. 2.75 to 3.25 ..... 25.00 to 26.00

\*Delivered San Francisco.

\*\*Duty paid, f.o.b. cars San Francisco.

**Bars.**—Movement of merchant steel bars remains light, most of the sales and inquiries being limited to less than carload lots. Prices are firm at 2.35c., c.i.f. Bookings of reinforcing steel bars, at 1100 tons, were the largest in over four weeks. The Northwest Steel Rolling Mills and the Pacific Coast Steel Corporation secured 300 tons each for the Washington Athletic Club in Seattle. The former company also booked 300 tons for the Fourteenth Avenue South bridge, Seattle, and 100 tons for a building in Tacoma for the Goodwill Industries. Pending business is not of heavy proportions. Bids are being taken on 1000 tons for the Medical Arts Building in Tacoma. Out-of-stock prices in the San Francisco district continue at 2.30c., base, on carload lots and at 2.60c. on smaller quantities. The Northwest Steel Rolling Mills secured 250 tons of rivet rods for the Navy Yard at Bremerton, Wash.

**Plates.**—The plate market is exceptionally quiet this week and pending business involves lots of less than 100 tons each. The Pittsburgh-Des Moines Steel Co. took 100 tons of plates and shapes for a 200,000-gal. tank and tower for Mesa, Ariz. Other awards included 300 tons for 40 tanks for the Shell Oil Co. at Seattle, booked by the Commercial Boiler Works. Prices are weak at 2.20c., c.i.f.

#### Warehouse Prices, f.o.b. San Francisco

Base per Lb.

Plates and struc. shapes.....	3.20c.
Soft steel bars.....	3.30c.
Small angles, $\frac{1}{8}$ -in. and over.....	3.15c.
Small angles, under $\frac{1}{8}$ -in.....	3.55c.
Small channels and tees, $\frac{3}{8}$ -in. to $2\frac{1}{4}$ -in.....	3.75c.
Spring steel, $\frac{1}{4}$ -in. and thicker.....	5.00c.
Black sheets (No. 24).....	4.90c.
Blue ann'l'd sheets (No. 10).....	3.90c.
Galv. sheets (No. 24).....	5.30c.
Struc. rivets, $\frac{1}{2}$ -in. and larger.....	5.65c.
Corn. wire nails, base per keg.....	\$3.40
Cement c't'd nails, 100 lb. keg.....	3.40

**Shapes.**—Awards of structural shapes totaled close to 2000 tons and included 286 tons for an apartment in Los Angeles, secured by McClintic-Marshall Co., and 200 tons for the Sauk River bridge at Everett, Wash., placed with an unnamed interest. Pending business totals less than 4000 tons. Bids have been opened on 400 tons for a shop building for the naval air station at Seattle. No new inquiries of importance came up for figures during the week. Plain shapes are firm at 2.35c., c.i.f.

**Cast Iron Pipe.**—The American Cast

Iron Pipe Co. took 250 tons of 12 to 24-in. Class B pipe for Salem, Ore., and 300 tons of various sizes for Vancouver, Wash. C. G. Claussen & Co. booked 123 tons of 4 to 8-in. pipe for Tacoma, Wash. San Diego placed 141 tons of 6 and 8-in. Class B pipe for Yell Street with the Griffith Co. New inquiries include 1816 tons of 6 to 24-in. Classes B and C pipe for Pasadena, Cal. Los Angeles opened bids this week on 2562 tons of 4 to 12-in. Class 150 pipe and on 762 tons of 6-in. Class 150 pipe. Bids were also opened at Portland, Ore., on 3675 tons.

**Steel Pipe.**—Movement of standard steel pipe and oil country goods continues light. Stocks in distributors' hands are well rounded out. Everett, Wash., will shortly be in the market for 800 tons of 12 to 24-in. lapwelded or electric welded steel pipe.

## Birmingham

### Pig Iron Reduced \$1 a Ton to \$14 Base—Steel Volume Below February Rate

BIRMINGHAM, March 18.—Books were opened for second quarter pig iron on March 12 at a base price of \$14, a reduction of \$1 from the first quarter price. This is the lowest price for Birmingham iron since November, 1915, being 50c. a ton below the price for the last half of 1929, which was the lowest since 1916. Numerous buyers have taken advantage of the low price to cover their probable requirements for the second quarter, though a good percentage of the melters have not come into the market at all.

Sales have been brisk, but the buying movement cannot be termed heavy. More iron has been sold during the first week after opening books than in the corresponding time during the last quarter. The tonnage left in first quarter books is light as compared with either of the two preceding quarters. Melters have light stocks and requests for shipments are becoming more numerous. In one or two instances current shipments are reported ahead of production.

Seventeen furnaces remain active. A change in the No. 5 furnace of the Tennessee company from foundry to basic iron leaves 10 furnaces producing foundry iron, six basic and one re-carburizing iron.

*Prices per gross ton, f.o.b. Birmingham dist. furnaces:*  
No. 2 fdy., 1.75 to 2.25 sil..... \$14.00  
No. 1 fdy., 2.25 to 2.75 sil..... 14.50  
Basic ..... 14.00

**Coke.**—Specifications for foundry coke average about the same as the rate during the past 60 days, the aggregate movement being less than at this time last year. Prices remain at \$5 a net ton, Birmingham.

**Old Material.**—With the activity in the market confined almost entirely to a few lines of steel scrap, the recent

curtailment of shipments by two of the larger steel mills has resulted in the lightest movement of scrap in several years. The lack of trading leaves values undeterminable and quotations unchanged.

*Prices per gross ton, deliv'd Birmingham dist. consumers' yards:*  
Heavy melting steel..... \$13.00 to \$13.50  
Scrap steel rails..... 14.00  
Short shoveling turnings..... 9.00  
Cast iron borings..... 9.00  
Stove plate ..... 11.50 to 12.00  
Steel axles ..... 22.00  
Iron axles ..... 23.00  
No. 1 railroad wrought..... 10.00 to 10.50  
Rails for rolling..... 15.50  
No. 1 cast ..... 13.00  
Tramcar wheels ..... 12.50  
Cast iron carwheels ..... 13.00 to 13.50  
Cast iron borings, chem. 13.50 to 14.00

**Finished Steel.**—Demand last week was a little better than in the preceding week, though on the whole there has been a slight recession this month from the February rate. Shapes, bars and sheets have been among the lines to feel the effects of a decline in demand. Incoming specifications are at about the same rate as during the past six weeks and mills continue to operate at close to the highest maximum percentage possible as based on ingot capacity.

Demand for reinforcing bars has increased notably under the influence of the spring buying season. Structural steel fabricators have been reducing backlog steadily during the past three weeks and they are now at the low point of the year.

Active open-hearths during March have averaged 19 of a total of 23.

**Cast Iron Pipe.**—District plants have submitted bids on upward of 15,000 tons of pipe in the Middle West and West. Projects are pending at Detroit, Columbus, Ohio, Kansas City, Mo., Portland, Ore., and Los Angeles. Results have not yet been announced. Summerville, N. C., is taking bids to-

day on 56,765 ft. of 6 to 10-in. pipe, and Shreveport, La., will open bids March 27 for about 1000 tons of 12 to 20-in. pipe. Tuscaloosa, Ala., will soon be in the market for 4000 ft. of 16-in. pipe, and Oklahoma City has a large project pending. Pressure pipe makers report new business about normal for

this season. Plants are operating at about 75 per cent of capacity, which is about the same as at this time last year. Shipments last week were heavier than in any week this year. Soil pipe makers report better shipments, but no change in demand. Prices are holding at \$37 to \$38.

will be about equal to the sales. Current bookings represent the present needs of consumers and virtually all orders are for immediate shipment. Automobile manufacturers are very conservative in their specifications. Purchases of sheets for second quarter can be made at about first quarter prices.

## Cincinnati

### Pig Iron Melt at Lowest Point in This Quarter—Sheet Demand at 60 Per Cent Rate—Scrap Dull

**CINCINNATI**, March 18.—With the needs of most of the district consumers covered for the next few weeks, the demand for pig iron in this area receded sharply last week. District furnace representatives report sales of only 1450 tons, of which about 300 tons was silvery.

Buyers continue their conservative policy, anticipating their needs only a few weeks and watching the trend of their own businesses. The melt is much lighter than at any time this quarter and much of the early optimism has disappeared.

Southern pig iron, despite the attractive prices in this district, is sluggish and only a small portion of the weekly sales is absorbed by Southern furnaces. An important Southern iron producer, which had been adhering to \$13.50, base Birmingham, brought its price down to \$13 last week, the prevailing quotation for shipment into this area.

A central Ohio consumer bought 150 tons of Southern foundry iron and a Michigan buyer took 250 tons of silvery. The Louisville & Nashville Railroad is in the market for 345 tons of foundry iron and 50 tons of charcoal iron.

*Prices per gross ton, deliv'd Cincinnati:*  
So. Ohio fdy., sil. 1.75 to 2.25.....\$19.89 to \$20.39  
Ala. fdy., sil. 1.75 to 2.25.....16.69 to 17.69  
Ala. fdy., sil. 2.25 to 2.75.....17.19 to 18.19  
Tenn. fdy., sil. 1.75 to 2.25.....17.19 to 17.69  
S'th'n. Ohio silvery, 8 per cent.....26.89

*Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.*

**Coke.**—With the melt light and the

demand for pig iron easing, specifications for foundry coke have diminished. A district seller of beehive coke closed two contracts to ship a total of 525 tons into the St. Louis district in April and May.

**Finished Material.**—A hand-to-mouth rate of purchasing is being followed by district users of sheets. The demand remained at about 60 per cent of normal last week. With mills depending on current tonnage to sustain production, operations this week

**Old Material.**—Reflecting the low operations of district mills, the scrap market is quiet and featureless. Mills have reduced shipments against old commitments. Dealers' prices, however, are steady.

*Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:*

Heavy melting steel.....	\$12.00 to \$12.50
Scrap rails for melting.....	13.25 to 13.75
Loose sheet clippings.....	8.00 to 8.50
Bundled sheets.....	10.75 to 11.25
Cast iron borings.....	9.00 to 9.50
Machine shop turnings.....	8.25 to 8.75
No. 1 busheling.....	10.00 to 10.50
No. 2 busheling.....	6.50 to 7.00
Rails for rolling.....	13.50 to 14.00
No. 1 locomotive tires.....	14.25 to 14.75
No. 2 railroad wrought.....	12.25 to 12.75
Short rails.....	17.75 to 18.25
Cast iron carwheels.....	12.00 to 12.50
No. 1 machinery cast.....	18.50 to 19.00
No. 1 railroad cast.....	15.00 to 15.50
Burnt cast.....	10.00 to 10.50
Stove plate.....	10.00 to 10.50
Brake shoes.....	10.00 to 10.50
Agricultural malleable.....	14.00 to 14.50
Railroad malleable.....	15.00 to 15.50

## Boston

### Pig Iron Sales Dwindle—Buffalo Furnace Withdraws Quotations Under \$17—Scrap Market Dull

**BOSTON**, March 18.—With most of the larger foundries covered on their requirements for the second quarter and fully half of the smaller melters likewise protected, sales have dwindled, totaling only about 4000 tons in the past week. Of this amount, Buffalo furnaces sold about 1700 tons and the Mystic furnace 1500 tons, the remainder having been made up of small lots of Alabama, western Pennsylvania and New York State iron.

One Buffalo furnace has withdrawn quotations of less than \$17, base furnace. Sales in the past week were generally at \$16 to \$16.50, Buffalo, or the equivalent if to be shipped from other districts. Alabama iron for rail and water delivery is quoted at \$13 to \$13.50, furnace.

*Foundry iron prices per gross ton deliv'd to most New England points:*  
†Buffalo, sil. 1.75 to 2.25.....\$20.28 to \$20.78  
†Buffalo, sil. 2.25 to 2.75.....20.78 to 21.28  
\*Buffalo, sil. 1.75 to 2.25.....20.91 to 21.91  
\*Buffalo, sil. 2.25 to 2.75.....21.41 to 22.41  
Va., sil. 1.75 to 2.25.....25.21  
Va., sil. 2.25 to 2.75.....25.71  
\*Ala., sil. 1.75 to 2.25.....22.61  
\*Ala., sil. 2.25 to 2.75.....23.11  
†Ala., sil. 1.75 to 2.25.....18.75  
†Ala., sil. 2.25 to 2.75.....19.25

*Freight rates: \$4.91 all rail and \$4.28 rail and water from Buffalo; \$5.21 all rail from Virginia; \$9.61 all rail from Alabama and \$5.75 rail and water from Alabama to New England seaboard.*

\*All rail rate.  
†Rail and water rate.

**Cast Iron Pipe.**—While foundries continue to quote 4-in. cast iron pipe at \$47.10 a ton, delivered common Boston freight rate points, and 6-in. and

larger dimensions at \$42.10 to \$43.10, the undertone of the market appears a little unsettled, presumably because the Pennsylvania and Jersey Central railroads have been ordered to suspend until June 20 increased rates on carlot shipments of pipe and fittings that were to become effective March 20. No large tonnages of pipe were placed openly in this territory the past week.

#### Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates.....	3.365c.
Structural shapes—	
Angles and beams.....	3.365c.
Tees.....	3.365c.
Zees.....	3.465c.
Soft steel bars, small shapes.....	3.265c.
Flats, hot-rolled.....	4.15c.
Reinforcing bars.....	3.265c. to 3.54c.
Iron bars—	
Refined.....	3.265c.
Best refined.....	4.60c.
Norway rounds.....	6.60c.
Norway squares and flats.....	7.10c.
Spring Steel—	
Open-hearth.....	5.00c. to 10.00c.
Crucible.....	12.00c.
Tie steel.....	4.50c. to 4.75c.
Bands.....	4.015c. to 5.00c.
Hoop steel.....	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex.....	*3.55c. to 5.55c.
Squares and flats.....	*4.05c. to 7.05c.
Toe calk steel.....	6.00c.
Rivets, structural or boiler.....	4.50c.
	Per Cent Off List
Machine bolts.....	50 and 5
Carriage bolts.....	50 and 5
Lag screws.....	50 and 5
Hot-pressed nuts.....	50 and 5
Cold-punched nuts.....	50 and 5
Stove bolts.....	70 and 10

\*Including quantity differentials.

Milton, Mass., will shortly be in the market for a tonnage of 6-in. pipe; Georgetown, Mass., contemplates a \$150,000 water system; Hanover, Mass., will soon take action on its water system; and several other municipalities are expected to come into the market soon.

**Reinforcing Steel.**—Billet steel reinforcing bars are now openly quoted as follows: 1 to 5-ton lots, 3.06½c. a lb., base, from stock; 5 to 99 tons, 2.66½c.; 100-ton and larger lots, 2.56½c. These prices are 10c. per 100 lb. less on 1 to 5-ton lots, and 20c. less on larger lots than openly quoted heretofore. The Concrete Steel Co. was awarded 615 tons for the Sears, Roebuck & Co. store addition. Other bookings did not aggregate 300 tons. Rail steel bars are openly quoted at 2.16½c. to 2.26½c. a lb., base, delivered Boston common freight rate points.

**Warehouse Business.**—Wire nails have been advanced 10c. per 100 lb., to \$3.15 a keg, base, from stock. Car lot shipments from mill are on a basis of \$2.40 a keg, and less than car lots, \$2.65. Warehouse products in general are moving slowly as compared with March, 1929, but slightly better than in February, this year.

**Old Material.**—Business was rather flat the past week. Dealers lowered prices on most grades of scrap and offerings dried up as a result. No. 1 heavy melting steel for eastern Pennsylvania delivery is \$10.10 a ton, on

cars shipping point, while \$10.30 seems to be the top price for Pittsburgh delivery. Of the 51 cars of miscellaneous scrap sold March 12 by the Boston & Maine Railroad, eight were of heavy melting steel and went at about \$17 a ton, delivered Pittsburgh. The American Steel & Wire Co., Worcester, Mass., bought little skeleton the past week, but a few small lots were taken for Pittsburgh delivery at around \$9 a ton on cars. At least one dealer has an open order for No. 1 railroad wrought, eastern Pennsylvania delivery, for which \$10.50 to \$11 a ton on cars is the market. The market for textile machinery cast is again unsettled. While \$13.50 to \$14 a ton, delivered, is the most commonly quoted price range, \$13 can be done.

*Buying prices per gross ton, f.o.b. Boston rate shipping points:*

No. 1 heavy melting steel	\$10.00 to \$10.50
Scrap T rails	10.00 to 10.25
Scrap girder rails	9.00 to 9.50
No. 1 railroad wrought	10.00 to 11.00
Machine shop turnings	6.00 to 6.50
Cast iron borings (steel works and rolling mill)	6.25 to 6.60
Bundled skeleton, long	8.75 to 9.30
Forge flashings	9.00 to 9.25
Blast furnace borings and turnings	5.50 to 6.00
Forge scrap	8.50 to 9.00
Shafting	14.00 to 15.00
Steel car axles	16.00 to 16.50
Wrought pipe 1 in. in. diameter (over 2 ft. long)	9.00 to 9.25
Rails for rolling	11.00 to 11.50
Cast iron borings, chemical	8.50 to 9.00
<i>Prices per gross ton deliv'd consumers' yards:</i>	
Textile cast	\$13.50 to \$14.00
No. 1 machinery cast	14.50 to 15.25
No. 2 machinery cast	14.00 to 14.50
Stove plate	11.00 to 11.50
Railroad malleable	16.50 to 17.00

Railroads are expected to issue requisitions shortly for second quarter requirements of plates, shapes and bars. Structural steel trade is quiet.

**Old Material.**—Scrap is moving freely to this market, but there is a lack of new business from the mills, which has had a tendency to soften the market slightly. Steel grades are off 25c. a ton.

Railroad lists: Chesapeake & Ohio, 10,023 tons; Louisville & Nashville, 6500 tons; Chicago, Burlington & Quincy, 4425 tons; Missouri-Kansas-Texas, 2500 tons; Chicago & Alton, 1160 tons; International Great Northern, 600 tons; Chicago & Illinois Midland, 200 tons; (No. 3 scrap rail); St. Louis-San Francisco, 96 carloads; St. Louis Southwestern, 21 carloads; Chicago, Milwaukee, St. Paul & Pacific, 17 carloads; Nashville, Chattanooga & St. Louis, 17 carloads; Pullman Co., St. Louis, 5 carloads.

*Dealers' buying prices per gross ton f.o.b. St. Louis district:*

Selected heavy melting steel	\$13.25 to \$13.75
No. 1 heavy melting or shoveling steel	12.50 to 13.00
No. 2 heavy melting or shoveling steel	11.75 to 12.00
No. 1 locomotive tires	14.50 to 15.00
Misc. stand.-sec. rails including frogs, switches and guards, cut apart	13.50 to 14.00
Railroad springs	16.00 to 16.50
Bundled sheets	9.50 to 10.00
No. 2 railroad wrought	12.50 to 13.00
No. 1 busheling	9.75 to 10.25
Cast iron borings and shoveling turnings	9.25 to 9.75
Iron rails	13.00 to 13.50
Rails for rolling	14.00 to 14.50
Machine shop turnings	6.75 to 7.25
Heavy turnings	9.00 to 9.50
Steel car axles	19.50 to 20.00
Iron car axles	26.00 to 26.50
Wrot. iron bars and trans.	21.00 to 21.50
No. 1 railroad wrought	12.50 to 13.00
Steel rails, less than 3 ft.	16.50 to 17.00
Steel angle bars	14.00 to 14.50
Cast iron carwheels	14.00 to 14.50
No. 1 machinery cast	15.25 to 15.75
Railroad malleable	14.75 to 15.25
No. 1 railroad cast	14.00 to 14.50
Stove plate	11.50 to 12.00
Relay. rails, 60 lb. and under	20.50 to 23.50
Relay. rails 70 lb. and over	26.50 to 29.00
Agricult. malleable	13.00 to 13.50

## St. Louis

### Pig Iron Melt Gaining But Buyers Are Covered for Immediate Future—Sheet Buying Better

**S**T. LOUIS, March 18.—Buying of pig iron continues light, most melters having purchased their requirements for the remainder of the first quarter. The St. Louis Gas & Coke Corporation sold approximately 2600 tons, and a leading Southern maker sold 1000 tons.

Shipments for March are ahead of those for February. The melt in the district continues steadily to increase. The stove foundries are beginning their operations for next season. The implement trade is good, and the demand for castings for the automobile industry is increasing. Prices are steady.

*Prices per gross ton at St. Louis:*

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	\$19.50 to \$20.00
Malleable, f.o.b. Granite City	20.00
N'th'n No. 2 fdy., deliv'd St. Louis	22.16
Southern No. 2 fdy., deliv'd 17.42 to Northern malleable, deliv'd	18.42
Northern basic, deliv'd...	22.16

Freight rates: 75c. (average) Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

**Finished Steel.**—Warehouses in St. Louis have put into effect a new pricing plan whereby quantity differentials are applied on bar size shapes, bands, hoops, plates, structural shapes,

blue annealed, black and galvanized sheets. The plan follows: 399 lb. and under, 50c. per 100 lb. above base; 400 to 3999 lb., base; 4000 to 7999 lb., 15c. per 100 lb. less than base; 8000 to 14,999 lb., 25c. per 100 lb. less than base; 15,000 lb. and over, 35c. per 100 lb. less than base.

Demand for sheets for mill shipment is showing some improvement.

### Warehouse Prices, f.o.b. St. Louis

Base per Lb.	Per Cent Off List
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.15c.
Cold-fin. rounds, shafting, screw stock	3.75c.
Black sheets (No. 24)	4.25c.
Galv. sheets (No. 24)	4.85c.
Blue ann'd sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	4.80c.
Galv. corrug. sheets	4.90c.
Structural rivets	4.15c.
Boiler rivets	4.15c.
Per Cent Off List	
Tank rivets, 7/8-in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	60
Carriage bolts	60
Lag screws	60
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	60
Less than 200 lb.	50
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	60
Less than 200 lb.	50

## Detroit Scrap Weak

**D**ETROIT, March 18.—Old material continues weak, but the general opinion seems to be that prices will remain about the same owing to reduced amount being produced in the district.

*Dealers' buying prices per gross ton, f.o.b. cars, Detroit:*

Hvy. melting and shov. steel	\$11.75 to \$12.25
Borings and short turnings	8.25 to 8.75
Long turnings	7.25 to 7.75
No. 1 machinery cast	11.50 to 12.00
Automotive cast	13.00 to 13.50
Hydraul. comp. sheets	11.25 to 11.75
Stove plate	9.00 to 9.50
New No. 1 busheling	11.00 to 11.50
Old No. 1 busheling	8.75 to 9.25
Sheet clippings	8.50 to 9.00
Flashings	10.75 to 11.25

## Rustless Steel for World's Largest Office Building

Rustless steel will be used for window trim and other decorative parts for the 85-story Empire State Building, New York. Contract for a large portion of the steel has been placed with the Central Alloy Steel Corporation. It is stated that this building will take approximately \$500,000 worth of the material.

## Buffalo

### Pig Iron Buying Conservative—Steel Mill Operations Unchanged—Scrap Surplus Is Piling Up

**BUFFALO**, March 18.—Sales of pig iron in this district in the past week were about 8000 tons. Buying has been very conservative, and very few sizable tonnages are reported. A considerable portion of the business was for the second quarter.

The foundry melt continues unchanged. Prices in the district are firm at \$18.50, base. It is probable that some of the Buffalo furnaces would do less than \$16.50 on sizable Eastern business.

Prices per gross ton, f.o.b. furnace:		
No. 2 fdv., sil. 1.75 to 2.25	\$18.50	
No. 2X fdv., sil. 2.25 to 2.75	19.00	
No. 1 fdv., sil. 2.75 to 3.25	20.00	
Malleable, sil. up to 2.25	19.00	
Basic	17.00	
Lake Superior charcoal	27.28	

**Finished Steel.**—Mill operations are about the same as they were last week. The Lackawanna plant of the Bethlehem Steel Co. is operating 19 open-hearths; Donner Steel Co., four; Wickwire Spencer Steel Corporation, two, and Gould Coupler Co., three. The Seneca Iron & Steel Co. and the Buffalo Bolt Co. are operating at about 70 per cent. There are good prospects for spring business in the reinforcing bar field, but no sizable tonnages have been placed.

**Old Material.**—Weakening influences are apparent, with new business at a minimum. Scrap is coming out more freely, and buyers are inclined to lower price ideas. Inquiries are out in Buffalo for stove plate and No. 1 machinery cast scrap. A buyer wants to place an order at \$12.50 for stove plate and \$13.25 for No. 1 cast. Considerable of the scrap usually shipped to Pittsburgh is backing up in this territory and creating a surplus.

Prices per gross ton f.o.b. Buffalo consumers' Plants:		
Basic Open-Hearth Grades:		
No. 1 heavy melting steel	\$14.50 to \$15.00	
No. 2 heavy melting scrap	12.50	
Scrap rails	14.75 to 15.25	
Hydraul. comp. sheets	12.50	
Hand bundled sheets	10.50 to 11.00	
Drop forge flashings	12.50	
No. 1 busheling	13.00 to 13.75	
Hvy. steel axle turnings	13.50 to 14.00	
Machine shop turnings	9.00 to 9.50	
No. 1 railroad wrought	11.00 to 11.50	
Acid Open-Hearth Grades:		
Knuckles and couplers	18.00 to 18.50	
Coil and leaf springs	18.00 to 18.50	
Rolled steel wheels	18.00 to 18.50	
Low phos. billet and bloom ends	18.00 to 18.50	
Electric Furnace Grades:		
Short shov. steel turnings	12.00 to 12.50	

#### Warehouse Prices, f.o.b. Buffalo

Base per Lb.

Plates and struc. shapes	3.40c.
Soft steel bars	3.30c.
Reinforcing bars	2.95c.
Cold-fin. flats, sq. and hex.	4.45c.
Rounds	3.95c.
Cold-rolled strip steel	5.85c.
Black sheets (No. 24)	4.20c.
Galv. sheets (No. 24)	4.85c.
Blue ann'l'd sheets (No. 10)	3.50c.
Com. wire nails, base per keg	\$3.20
Black wire, base per 100 lb.	3.45

Blast Furnace Grades:		
Short mixed borings and turnings	11.00 to 11.50	
Cast iron borings	11.00 to 11.50	
No. 2 busheling	8.00	
Rolling Mill Grades:		
Steel car axles	17.00 to 17.50	
Iron axles	20.00 to 21.00	
Cupola Grades:		
No. 1 machinery cast	14.00 to 14.50	
Stove plate	12.50 to 12.75	
Locomotive grate bars	10.50 to 11.00	
Steel rails, 3 ft. and under	17.50 to 18.00	
Cast iron carwheels	12.00 to 12.50	
Malleable Grades:		
Industrial	16.50 to 17.00	
Railroad	16.50 to 17.00	
Agricultural	16.50 to 17.00	
Special Grades:		
Chemical borings	12.00 to 12.50	

Per Net Ton		
No. 1 mach'ry cast	\$15.00	
Stove plate	11.00	
Standard carwheels	14.00	
Malleable scrap	11.00	

dealers also report improvement in steel scrap demand. Dealers' prices are unchanged.

#### Dealers' buying prices:

	Per Gross Ton	Per Net Ton
Toronto		
Heavy melting steel	\$9.00	\$8.00
Rails, scrap	11.00	9.00
No. 1 wrought	9.00	11.00
Machine shop turnings	7.00	6.00
Boiler plate	7.00	6.50
Heavy axle turnings	7.50	6.50
Cast borings	6.50	5.00
Steel borings	6.50	6.00
Wrought pipe	6.00	6.00
Steel axles	14.00	17.00
Axles, wrought iron	16.00	19.00
No. 1 machinery cast	16.00	16.00
Stove plate	12.00	12.00
Standard carwheels	14.50	14.50
Malleable	13.00	13.00
Montreal		
Heavy melting steel	\$9.00	\$8.00
Rails, scrap	11.00	9.00
No. 1 wrought	9.00	11.00
Machine shop turnings	7.00	6.00
Boiler plate	7.00	6.50
Heavy axle turnings	7.50	6.50
Cast borings	6.50	5.00
Steel borings	6.50	6.00
Wrought pipe	6.00	6.00
Steel axles	14.00	17.00
Axles, wrought iron	16.00	19.00
No. 1 machinery cast	16.00	16.00
Stove plate	12.00	12.00
Standard carwheels	14.50	14.50
Malleable	13.00	13.00

## Railroad Equipment

### Norfolk & Western Orders 1000 Steel Car Bodies

**RAILROAD** equipment buying of the week included 1000 steel hopper car bodies for the Norfolk & Western; 200 box cars to be built by the Bangor & Aroostook in its own shops, and 400 cars for the Minneapolis, St. Paul & Sault Ste. Marie. Details follow:

Bangor & Aroostook has ordered 200 steel-frame box cars from its own shops.

United States Navy has ordered four helium tank cars from General American Tank Car Corporation.

Chicago, Rock Island & Pacific has ordered five baggage cars from American Car & Foundry Co.

Milwaukee Road has withdrawn its inquiries for 750 stock cars.

Norfolk & Western has ordered 1000 steel hopper car bodies from Virginia Bridge & Iron Co.

Minneapolis, St. Paul & Sault Ste. Marie has ordered 200 hopper cars from Pullman Car & Mfg. Corporation and 200 box cars from Siems-Stembie Co.

Louisville & Nashville has revived its inquiry for six Mountain-type passenger locomotives.

### Austin Co. Books Several Large Plant Extensions

Orders for the following industrial plants and extensions were taken during the week by the Austin Co., Cleveland: five one, two and three-story buildings for the West Coast plant at San Francisco of the Link-Belt Co., Chicago, including an assembly plant and crane runways all to cost \$500,000; a cooperage and storage plant for the Selden Co., Pittsburgh, chemical manufacturer; an aluminum foundry at Oakland, Cal., for the Aluminum Cooking Utensil Co., Pittsburgh; a dry ice factory and warehouse at Seattle, Wash., for the Liquid Carbonic Corporation, Chicago; a warehouse at Ecorse, Mich., for the National Smelting & Refining Co., Detroit; addition to the machine shop of the Connersville Blower Co., Inc., at Connersville, Ind.; repair shop in San Francisco for the Southern Pacific-Golden Gate Ferries, Ltd.

**Structural Steel.**—Fabricators look for a good demand throughout the spring and summer. Orders aggregating about 15,000 tons are in prospect for early closing in the Toronto district, and, in addition to the large tonnage required for Canadian National improvements at Montreal, that district will require upward of 20,000 tons.

**Old Material.**—There are indications of early improvement in buying. Mills are coming into the market for heavy melting steel, and shipments to the Hamilton district are large. Montreal

## Steel forgings containing Nickel

(Concluded from page 852)

used with excellent results for such parts as large stamp-mill shafts which were subjected to such severe impact that it was difficult to get any steel to stand up.

Recently the same steel, except with a slightly higher carbon and manganese, has been extensively used in the normalized condition for locomotive forgings, such as main and side rods, axles, piston rods and crankpins. Its toughness is definitely shown by Izod impact tests of from 50 to 70 ft.-lb. in normalized forgings of fair size.

**Nickel-Chromium Steels:** By a combination of nickel and chromium it is possible to get a stronger, harder steel than by the use of either alone, yet one having good fatigue and impact values. Since these properties are best developed by the quench-and-temper heat treatment, comparatively little nickel-chromium is used in the annealed condition.

It is commonly known that chromium steels exhibit under certain conditions a phenomenon known as "temper" or "blue-brittleness," and nickel-chromium steels are no exception. If, for example, a nickel-chromium steel forging be slowly cooled from the tempering temperature it may be found that when cold the forgings are very brittle and will not withstand shock. The remedy is simple—cool rapidly from the tempering treatment by quenching.

**Nickel-Molybdenum Steels:** The combination of nickel and molybdenum is an excellent one. Nickel-molybdenum steels are easier to make than steels containing oxidizable elements; they exhibit remarkably uniform properties, forge readily and respond nicely to any heat treatment. Molybdenum, in addition, has the property of eliminating temper-brittleness.

**Nickel-Chrome-Molybdenum Steels:** Although more expensive, a steel containing nickel, chromium and molybdenum has excellently balanced characteristics, being strong, tough and hard. It responds to heat treatment readily and is free from temper-brittleness. This steel, or a similar one with the addition of vanadium, is quite widely used for die blocks, the large majority of which are made from nickel alloy steel.

**Nickel-Vanadium and Nickel-Chrome-Vanadium Steels:** These steels are not as extensively used as they might well be. Nickel-vanadium steel is used for large castings in order to obtain a fine-grained steel with high strength and ductility. The same features which make it valuable for castings recommend it for large forgings.

All large forgings are—or should be—heated treated before delivery. The treatments used are the three standard ones of annealing, normalizing and quenching and tempering. Essen-

tially, the procedure is the same as with smaller pieces, but it is imperative that consideration be given to the masses involved and stresses set up.

Today annealing seems to be giving way to normalizing and the bulk of large forgings are either normalized or quenched and tempered. Further, for very large forgings, say 40 in. in diameter and length or equivalent section, the normalizing treatment is generally the only one used.

### Properties to Be Expected

To venture into the field of what properties may be expected and what properties should be specified for forgings is to tread on dangerous ground. Smaller objects are more uniform in size, are more homogeneous and respond more uniformly to heat treatments. Each large forging is a law unto itself. Table I gives, for large forgings of nickel alloy steel, specifications which are considered standard, the properties which may reasonably be expected from what might be called the "average" of each group and concrete examples of properties which have actually been obtained in practice.

### A Word on Inspection

This paper would be incomplete without a word on inspection—perhaps the most important and certainly the most damned function connected with all steel production. Tensile test pieces intelligently chosen give a good idea of the character of the object inspected. Unwisely picked, they are worse than useless.

The heavy etching of blooms for forgings and for forgings themselves has come into vogue recently. This, it seems, can only tend toward the betterment of the product and therefore advantageous to both the purchaser and the manufacturer. The fly in the ointment is that of interpretation of results, and it is very difficult to set standards of what is and what is not acceptable. The same is true of the photomicrographic standard included now in many specifications.

### Conclusion

The quality of large forgings has been getting progressively better for many years. Today the designing engineer can justifiably have entire confidence in material of this sort. But, through the use of improved steel-making processes, the further use of alloys and the improvement in mechanical and heat treatment, it is entirely probable that the product a few years from now will be as much better than the product of today as the product of today is better than that of 20 years ago.

### Non-Ferrous Ingot Sales

On March 1, unfilled orders for brass and bronze ingots and billets on the books of the members of the Non-Ferrous Ingot Metal Institute amounted to a total of 8821 net tons. This compares with 9630 tons on Feb. 1 and with 9578 tons on Jan. 1.

## Sheet Sales Off, Output Up, in February

Sharp reduction in sales of steel sheets, coupled with good production, in February, caused a decline in unfilled orders, as shown by the report of the National Association of Flat Rolled Steel Manufacturers. Sales dropped 40 per cent from January. Production, while down 5½ per cent in total tonnage, was at a higher rate by 8 per cent, in the shorter month. Shipments were in the same tonnage as in January, but were a higher proportion of capacity.

Both the February report and comparisons with the two next preceding months appear in the appended table.

	Net Tons	Feb.	Jan.	Dec.
Capacity .....	486,500	556,000	452,700	
Percentage reporting	67.5	67.5	67.0	
Sales .....	203,315	382,122	234,599	
Production .....	275,952	291,529	181,916	
Shipments .....	241,441	241,677	178,575	
Unfilled orders .....	617,215	558,412	443,127	
Unshipped orders .....	125,839	117,584	101,008	
Unsold stocks .....	75,771	73,948	72,611	

### Percentages, Based on Capacity

Sales .....	61.8	101.8	77.4
Production .....	83.9	77.6	60.0
Shipments .....	73.4	64.4	58.9
Unfilled orders .....	157.4	146.2	146.2
Unshipped orders .....	38.3	31.3	33.3
Unsold stocks .....	23.1	19.7	24.0

## More Automobiles Made in February

WASHINGTON, March 18.—Production of motor vehicles in the United States in February, with its 28 days, totaled 323,962 units, the highest month's output since last October, with its 31 days, when 380,017 were made. The February production exceeded that of January, with an output of 273,170 units, by 50,792.

February production included 275,811 passenger cars and 47,129 trucks, according to reports received by the Department of Commerce from manufacturers. Passenger car output in February exceeded that of January by 41,285. Production of motor trucks in February was greater by 9058 than that of January. February production of taxicabs was 1022, against 572 in January.

Canadian production of motor vehicles in February, totaling 15,548 units, was greater than for any month since last July, with an output of 17,461. The February output surpassed that of January, with a total of 10,388, by 5460.

Of the Canadian production in February, 13,021 units were passenger cars, against 8856 in January, and 2527 trucks, compared with 1532 in January.

Metal furniture exports from the United States for 1929 showed a slight increase over the previous year, shipments increasing from \$6,197,599 in 1928 to \$6,259,874, a gain of 1 per cent, according to the Specialties Division, Department of Commerce. All individual groups showed an increase in 1929, with the exception of metal filing cases, which dropped off sharply from the high level reached in 1928.

# Non-Ferrous Metal Markets

## Copper Quiet—Tin Dull and Weak—Lead Active—Zinc Sluggish

NEW YORK, March 18.

**Copper.**—This is still a buyers' market. Conditions have changed little. Sales to foreign countries are keeping up at the rate early in the month of about 1000 tons daily, the total thus far this month being about 17,000 tons. This is equal to, if not a little larger than, the January or February sales. Domestic consumers are still buying only from hand to mouth, but producers state that there is some improvement. It is by no means large or satisfactory, however. Some consumers still believe, or at least are hoping, that there will be a reduction in price and therefore do not see any reason to purchase ahead. The same attitude is even being observed by some foreign consumers.

There has been no change in price, and this is still firm at 18c., delivered in the Connecticut Valley, for electrolytic copper and at 18.30c., c.i.f. usual European ports, for export. There are some indications that producers expect the price to remain unchanged, certainly through the first half of the year. Lake copper is only moderately active at 18c. to 18.12½c., delivered.

Statistics for February showed a fairly large increase in stocks of refined copper at about 29,000 tons. There was a decrease in copper in blister form, so that the total copper above ground was only about 25,000 tons. Production showed a decrease, but not as large as it will probably be this month and next, when curtailment at the mines will be more pronounced in its effect. Statements in the press regarding large imports are characterized by producers as not at all out of the ordinary as normally there are imports each month of blister copper from Africa and other sources.

**Tin.**—Sales of spot Straits tin were exceedingly small during the past week. Following the large sales a week ago, a very quiet market was expected and has been realized. Despite the fact that a new low price in several years was touched yesterday, at 35.80c. for spot Straits tin, New York, consumers did not enter the market. That quotation represents a range of 35.75c. to 35.87½c. on that day. Today the market is still inactive, with spot Straits tin quoted at 36.12½c., New York.

There was a further increase last

### THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	Mar. 18	Mar. 17	Mar. 15	Mar. 14	Mar. 13	Mar. 12
Lake copper, New York.....	18.12½	18.12½	18.12½	18.12½	18.12½	18.12½
Electrolytic copper, N. Y. ....	17.75	17.75	17.75	17.75	17.75	17.75
Straits tin, spot, N. Y. ....	36.12½	35.80	...	35.87½	36.00	36.50
Zinc, East St. Louis.....	4.95	4.95	4.95	4.95	4.95	4.95
Zinc, New York.....	5.30	5.30	5.30	5.30	5.30	5.30
Lead, St. Louis.....	5.40	5.40	5.40	5.40	5.40	5.40
Lead, New York.....	5.50	5.50	5.50	5.50	5.50	5.50

\*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

### Rolled Products

#### List Prices, Per Lb., f.o.b. Mill

*On Copper and Brass Products, Freight up to 75c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over*

#### Sheets—

High brass.....	23.25c.
Copper, hot rolled.....	26.75c.
Zinc.....	10.50c.
Lead (full sheets).....	9.50c.

#### Seamless Tubes—

High brass.....	28.25c.
Copper.....	29.25c.

#### Rods—

High brass.....	21.25c.
Naval brass.....	24.00c.

#### Wire—

Copper.....	19.87½c.
High brass.....	23.75c.
Copper in Rolls.....	26.75c.
Brazed Brass Tubing.....	30.87½c.

#### Aluminum Products in Ton Lots

*The carload freight rate is allowed to destinations east of Mississippi River and also to St. Louis on shipments to points west of that river.*

Sheets, 0 to 10 gage, 3 to 30 in. wide.....	31.30c.
Tubes, base.....	42.00c.
Rolled rods in coils.....	31.00c.

### Chicago Warehouse

*(Prices Cover Trucking to Customers' Doors in City Limits)*

Sheets—	Base per Lb.
High brass.....	23.25c.
Copper, hot rolled.....	27.75c.
Copper, cold rolled, 14 oz. and heavier.....	30.00c.
Zinc.....	10.75c.
Lead, wide.....	10.30c.

#### Seamless Tubes—

Brass.....	28.25c.
Copper.....	29.25c.

Brass Rods.....	21.25c.
Brazed Brass Tubes.....	31.00c.

### New York or Cleveland Warehouse

#### Delivered Prices, Base per Lb.

High brass.....	21.12½c. to 22.12½c.
Copper, hot rolled, base sizes.....	27.75c. to 28.75c.
Copper, cold rolled, 14 oz. and heavier, base sizes.....	30.00c. to 31.00c.

#### Seamless Tubes—

Brass.....	26.00c. to 27.00c.
Copper.....	29.12½c. to 30.12½c.

Brass Rods.....	18.87½c. to 19.87½c.
Brazed Brass Tubes.....	29.12½c. to 30.12½c.

### New York Warehouse

#### Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks.....	10.75c. to 11.25c.
Zinc sheets, open.....	11.50c. to 12.00c.

### Metals from New York Warehouse

#### Delivered Prices, Per Lb.

Tin, Straits pig.....	38.25c. to 39.25c.
Tin, bar.....	40.25c. to 42.25c.
Copper, Lake.....	19.50c.
Copper, electrolytic.....	19.25c.
Copper, casting.....	19.00c.
Zinc, slab.....	6.50c. to 7.50c.
Lead, American pig.....	6.50c. to 7.00c.
Lead, bar.....	8.50c. to 9.00c.
Antimony, Asiatic.....	10.50c. to 11.00c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure).....	25.00c. to 26.00c.
Alum. ingots, No. 12 alloy.....	24.00c. to 25.00c.
Babbitt metal, commercial grade.....	25.00c. to 35.00c.
Solder, ½ and ¾.....	25.75c. to 26.75c.

### Metals from Cleveland Warehouse

#### Delivered Prices, Per Lb.

Tin, Straits pig.....	41.50c.
Tin, bar.....	43.50c.
Copper, Lake.....	19.50c.
Copper, electrolytic.....	19.25c.
Copper, casting.....	18.75c.
Zinc, slab.....	7.50c. to 7.75c.
Lead, American pig.....	6.50c. to 6.75c.
Lead, bar.....	8.75c.
Antimony, Asiatic.....	16.00c.
Babbitt metal, medium grade.....	17.50c.
Babbitt metal, high grade.....	44.50c.
Solder, ½ and ¾.....	27.50c.

### Old Metals, Per Lb., New York

*Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses.*

Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible.....	15.00c.
Copper, hvy. and wire.....	14.50c.
Copper, light and bottoms.....	12.50c.
Brass, heavy.....	8.00c.
Brass, light.....	6.75c.
Hvy. machine composition.....	11.25c.
No. 1 yel. brass turnings.....	9.00c.
No. 1 red brass or compositions, turnings.....	10.50c.
Lead, heavy.....	4.25c.
Lead, tea.....	3.00c.
Zinc.....	2.75c.
Sheet aluminum.....	10.00c.
Cast aluminum.....	9.50c.
	11.50c.

week in stocks of tin in London warehouses, amounting to 392 tons, bringing the total on Saturday, March 15, to 15,894 tons. Shipments from the Straits for the first half of March were 4423 tons, or about equal to the estimates early in the month of 8500 tons for the full month. Prices in London today were down from those of a week ago, with spot standard quoted at £162, future standard at £164 2s. 6d. and spot Straits at £164 5s. The Singapore price today is £165 10s.

**Lead.**—Apparently convinced that the present low prices of lead are scraping bottom, consumers have been active buyers for as far ahead as they could contract. Sales have been quite lively and prices in the West are a little stiffer, the quotations standing at 5.40c. to 5.50c., St. Louis.

The contract price of the leading interest is unchanged at 5.50c., New York, and business in the East is reported as fairly good.

**Zinc.**—Prime Western zinc has settled after several weeks of weakness at 4.95c., East St. Louis, or 5.30c., New York, for shipment through April. There are some producers who will not sell at less than 5c., East St. Louis, but there appears to be enough metal available at 4.95c. to satisfy a demand which is quite unsatisfactory. Specifications on contract, however, are in good volume.

The ore price is unchanged at \$37, Joplin. Sales last week were small again, at 5770 tons, and the production was about 10,000 tons. Shipments, however, were over 10,100 tons, so that there was a slight decrease in the surplus, estimated now at 9852 tons.

**Antimony.**—The market is quiet and lower, with Chinese metal quoted at 8c. for spot and at 7.75c. for futures. It being apparent from action of the Senate recently that there will be no change in the duty on antimony, quotations for futures are now resumed on the duty-paid basis.

**Nickel.**—Wholesale lots of ingot nickel are quoted at 35c. a lb., with shot nickel at 36c. and electrolytic nickel in cathodes at 35c.

**Aluminum.**—According to published quotations virgin metal, 98 to 99 per cent pure, is unchanged at 23.90c. a lb., delivered.

#### Non-Ferrous Metals at Chicago

CHICAGO, March 18.—This market is quiet from the viewpoint of sales. Prices, with the exception of copper, are unstable. The old metal market is dull.

**Prices per lb., in carload lots:** Lake copper, 18.50c.; tin, 36.50c.; lead, 5.25c.; zinc, 5c.; in less-than-carload lots, antimony, 9c. On old metals we quote copper wire, crucible shapes and copper clips, 14c.; copper bottoms, 11.50c.; red brass, 11.50c.; yellow brass, 8c.; lead pipe, 4c.; zinc, 3c.; pewter, No. 1, 18c.; tin-foil, 20c.; block tin, 25c.; aluminum, 12.87½c.; all being dealers' prices for less-than-carload lots.

## OBITUARY

CHARLES L. NEWCOMB, one of the organizers of the New England Foundrymen's Association, the American Foundrymen's Association, and the National Founders Association, died March 13, aged 76 years. He was one of 16 men who organized the National Founders Association and was elected a vice-president at the first meeting. He was for about 50

organization for 44 years, having gone to work for the purchasing department of Carnegie Brothers & Co., Ltd., on Feb. 1, 1886. After serving in various clerical departments of the company, he became assistant auditor, and in 1900 was made auditor and assistant secretary. He continued in this position after the formation of the United States Steel Corporation, and also served in an executive capacity in several of the allied subsidiary companies.

JAMES F. SULLIVAN, a leader in the development of the Midvale Steel Co. and vice-president up to the time of its merger with the Bethlehem Steel Co., died of pneumonia at his home at Radnor, Pa., March 17, aged 84 years.

HENRY B. MYERS, district manager for the Lehigh Structural Steel Co., died March 14 at his home in Washington, aged 41 years.

JOHN B. WATLING, formerly proprietor of the Watling Scale Mfg. Co., Chicago, died March 14 at the Illinois Masonic Hospital after an illness of five months.

JAMES V. MCCRAE, research associate, Steel Castings Development Bureau, Philadelphia, died on March 5. For the past two years he had been operating, at the United States Bureau of Standards, under the research associate plan, engaged upon work for the Steel Castings Development Bureau.

FRANK H. BRADBURY, secretary and assistant treasurer of the H. C. Cook Co., Ansonia, Conn., died on March 6.



CHARLES L. NEWCOMB



JAMES J. CAMPBELL

years general manager of the Deane Steam Pump Works, Holyoke, Mass., during the time that it was an independent company and also after it entered the combination headed by the Worthington Pump & Machinery Corporation. He retired from active business about three years ago, and since then has spent most of his time in Florida. He was elected a vice-president in 1926 of the American Society of Mechanical Engineers.

JAMES J. CAMPBELL, since 1927 vice-president and secretary and a director of the Carnegie Steel Co., Pittsburgh, died on March 17 at Pasadena, Cal., aged 65 years. He had been identified with the Carnegie

WASHINGTON, March 18.—Orders for fabricated structural steel in February totaled 224,299 tons, or 73 per cent of capacity, according to reports received by the Department of Commerce from 191 firms with a monthly capacity of 306,588 tons, against January orders of 206,671 tons or 63 per cent of the capacity of the 217 reporting firms, having a capacity of 330,473 tons. Orders reported in February of last year were 222,723 tons, or 69 per cent of the capacity of the 236 reporting firms, with a monthly capacity of 320,900 tons.

Computed bookings in February were 292,000 tons, compared with 252,000 tons in January, and 265,650 tons in February of last year. Shipments in February were computed at 304,000 tons, or 76 per cent of capacity, against 244,000 tons, or 61 per cent of capacity in January, and 238,700 tons, or 62 per cent of capacity, in February of last year.

## PERSONAL

**ROBERT P. J. McCARTY** has been appointed manager of the newly established New England office of the Associated Alloy Steel Co., Cleveland, agent for stainless steels manufactured by Ludlum Steel Co., Sharon Steel Hoop Co. and the Timken Steel & Tube Co.

**CHARLES MCKNIGHT**, in charge of the alloy steel department, International Nickel Co., New York, will address the Southern and Southwestern Railroad Club at Atlanta, Ga., March 20, on the subject of alloy steels in the railroad field.

**JAMES W. SCHOFIELD**, formerly of the Los Angeles office of the Columbia Steel Corporation, has become associated with the American Rolling Mill Co. of California, San Francisco. He had previously been identified with the Pacific Sheet Steel Co. and the Pittsburgh Crucible Steel Co.

**E. R. BISHOP**, heretofore vice-president of the Globe Forge & Foundries, Inc., Syracuse, N. Y., has been elected president, succeeding the late W. Charles Lipe.

**THEODORE HILL** has been appointed sales manager of the Detroit Gray Iron Foundry Co., Detroit.

**D. C. BOYD** has been elected chairman of the board of the Galion Iron Works & Mfg. Co., Galion, Ohio, and **JOHN L. CONNORS** has been made vice-president and general manager. Other officers elected include **J. S. BOYD**, vice-president; **R. E. BOYD**, works manager; **J. X. FARRAR**, secretary, and **H. SUPP, JR.**, treasurer.

**SIDNEY WASLEY**, formerly manager of the Youngstown district office of the Mathews Conveyor Co., Ellwood City, Pa., has been made manager of the Pittsburgh office, succeeding **F. M. FISH**, who has resigned. Mr. Wasley will have as his assistant **ALBERT M. KERR**, who has been located in the home office.

**J. B. JOHNSON**, chief, materials branch, Wright Field, Dayton, Ohio, will deliver an address on air craft materials at a meeting of the New Haven chapter of the American Society for Steel Treating, March 20, at Red Men's Hall, Wallingford, Conn.

**ROBERT A. HORNER** has been appointed acting sales manager of the machine and small tools divisions of Barber-Colman Co., Rockford, Ill., to succeed the late **FRANK G. HOFFMAN**.

**M. F. O'CONNOR**, who was eastern sales and export manager of the Phoenix Mfg. Co., Joliet, Ill., has been made a vice-president.

**PAUL J. KALMAN** has been elected chairman of the board of directors of Bliss & Laughlin, Inc., Harvey, Ill., manufacturer of cold-drawn steel and shafting. **WALTER R. HOWELL**, formerly vice-president, has become president and general manager. Starting as a clerk and progressing through promotions in the Illinois Steel Co., Mr. Howell continued with the company until the beginning of the World War, when he became associated with the American Iron and Steel Institute, compiling statistics and allocat-



W. R. HOWELL

been appointed the Indiana representative of sanders, grinders and saws for the Porter-Cable Machine Co., Syracuse, N. Y.

**FRANK B. HAMERLY** has been elected vice-president in charge of manufacturing of the Independent Pneumatic Tool Co., Chicago.

**D. E. ANDERSON**, formerly a member of the staff of the Carrier Engineering Corporation, has been appointed to serve the New England territory, with headquarters at 10 High Street, Boston, for Young Brothers Co., Detroit. **P. A. MEYER**, who has represented the company in western New York, has been transferred to the Detroit office, and he will be succeeded by **G. C. BECHER**. **J. J. FERRIS**, until recently with the Carrier Engineering Corporation, has been appointed to assist Mr. Thatcher in the New York office.

**R. S. BEGG** has been appointed chief engineer of the Midland Steel Products Co., Cleveland. He had previously held similar positions with the Stutz Motor Car Co., Indianapolis, the Budd Wheel Co. and the Jordan Motor Car Co.

**MARCUS A. GROSSMANN**, chief metallurgical engineer, Central Alloy Steel Corporation, Canton, Ohio, has accepted the invitation of the American Society for Steel Treating to deliver the Campbell memorial lecture at the Twelfth Annual Metal Congress to be held in Chicago during the week of Sept. 22 at the Hotel Stevens. The lecture is scheduled for Sept. 24 before the annual meeting of the society, but the subject is not yet announced. Mr. Grossmann is the author of numerous technical papers and is co-author of "Physical Metallography." He was graduated from the Massachusetts Institute of Technology in 1911 with the degree of Bachelor of Science. After teaching for a year, he was associated successively with the Pittsburgh Testing Laboratories, the Vanadium Corporation of America, the United States Bureau of Standards, the Electric Alloy Steel Co., Atlas Steel Corporation, United Alloy Steel Corporation, and, since 1926, with the Central Alloy Steel Corporation.

**LEO DOLKART**, formerly proprietor of the Moline Electric Co., Moline, Ill., has been named superintendent of electrical construction for the Kahn Engineering Co., Detroit. He will leave soon for Russia where he will have charge of the electrical work in connection with a large factory construction program.

**F. SETO**, metallurgical engineer, Mitsubishi Dockyard & Engine Works, Kobe, Japan, visited the Hunt-Spiller Mfg. Co., Boston plant last week. He is making his headquarters while in this country at the Westinghouse Air-brake Co., Wilmerding, Pa., plant.

ing tonnages purchased by the Government. He has been identified with Bliss & Laughlin, Inc., since 1920. **W. P. MITCHELL**, who has been in the steel industry for the past 28 years, 18 of which were with the Illinois Steel Co., and since 1920 with Bliss & Laughlin, Inc., has been elected vice-president, and **HOWARD H. HERSEY** has been reelected treasurer.

**FRANK W. CURTIS**, until recently connected with P. R. Mallory & Co., Inc., as chief engineer in charge of Carboloy manufacture and developments, has joined the Kearney & Trecker Corporation, Milwaukee, as research engineer.

**E. L. IVES**, vice-president of H. A. Brassert & Co., Chicago, has sailed for England on a business trip.

**F. H. FRANKLIN**, metallurgical chemist, Providence, R. I., and **W. H. KENERSON**, professor of mechanical engineering, Brown University, were scheduled to speak on "The Microstructure of Steel" at a meeting of the Rhode Island chapter of the American Society for Steel Treating, March 19, in the engineering laboratory of Brown University.

**W. A. MARSHKE**, one of the designers of the Marschke grinder, has

CARL TAYLOR COMPTON, head of the physics department of Princeton University, has been made president of the Massachusetts Institute of Technology, effective in July, to succeed SAMUEL W. STRATTON. Dr. Stratton has been made chairman of the executive committee, newly created, and will share in the responsibilities of the institute without attending to details. Dr. Compton is 42 years old and a native of Wooster, Ohio.

M. D. CURRAN has resigned as president of the St. Louis Gas & Coke Corporation, of which he has been the operating head for the last seven years, and O. L. PRINGLE, of Midland, Pa., has been made vice-president and



M. D. CURRAN

general manager, with headquarters at Granite City, Ill., where he will have charge of the operation of the plant. JOHN DUNCAN, of Alton, Ill., has been elected president, but he will be inactive. Mr. Curran went to the St. Louis company in 1923 as general superintendent in charge of operations at Granite City, Ill. In 1925 he became vice-president in charge of operations, and the following year, vice-president and general manager. He was elected president in January, 1928.

F. H. WILCOX, vice-president of Freyn Engineering Co., Chicago, returned from Europe March 4 on the Ile de France. He has been abroad in connection with a blast furnace plant to be built at Dagenham, England, which is being designed by Freyn Engineering Co. for the Ford Motor Co.

H. L. ROWND, vice-president in charge of finances for the Republic Iron & Steel Co., Youngstown, has retired from the company, effective March 15, and will spend several months in travel and rest. He went with the company at the time of its founding in May, 1899, after having gained early business and financial experience in Columbus, Ohio, and served successively as cashier, auditor, treasurer and vice-president.

## Jobbing Foundry Uses Conveyors

(Concluded from page 857)

Among the benefits which have accrued from the installation of this system—both physical and with regard to control—has been a radical reduction in cost, through elimination of a large amount of manual labor. At the same time, the improvement has extended to the point of increased tonnage, which has resulted automatically in a lowering of unit overhead charges.

Present capacity is so far ahead of that under the old regime that what was then a month's work can be done now in a little more than a week—say, in a day or two over the complete week. Conversely, what can now be produced in a day or a week would have been a physical impossibility, in the area available, under the old methods.

All of this engineering work was done within the organization, under

the direction of E. F. Miltenberger, vice-president, and Frank D. Campbell, chief engineer. A short time ago both Mr. Miltenberger and Mr. Campbell withdrew from Eastern Steel Castings to promote the conveyor system which they had devised. The Eastern Corporation was formed, with offices in the Graybar Building, New York. Manufacturing connection was made with the Gifford-Wood Co., Hudson, N. Y., to take advantage of the machining opportunities there available. This new arrangement covers the entire conveyor division, which had been built up in Newark to do the engineering and construction work on foundry handling systems.

In a second article will be described the operation of this plant from the shake-out through the cleaning department and to the shipping floor. This covers features which are unusual in a plant of this type, and which have been worked out in a manner to pass the materials through with the least possible amount of confusion and with no back-tracking.

## Cutting With Carbide Tools

(Concluded from page 864)

eron, fabroid, fiber glyptal, micalex and graphite products. In the past these products could be machined economically only by the use of commercial diamond tools. Although these composition materials are not very hard and their tensile strength is comparatively low, their abrasive properties are such that they quickly dull ordinary cutting tools. Carbide tools have almost entirely replaced the diamond in this class of work.

It may readily be seen that the rakes and angles suggested in our summary present a somewhat radical departure from those used with high-speed tools. We must, however, thoroughly appreciate the fact that cemented tungsten carbide is a non-ferrous metallic substance, and not a steel. Past experience in the high-speed tool field has no bearing upon the successful application of carbide tools in the metal-cutting industry of today. The fact should also be borne in mind that the condition of the machine, position, rigidity and overhang of the tool, and type or class of operator, are important factors in successful performance.

### Suitable in Other Fields—in Dies

The use of cemented tungsten carbide is not limited to cutting tools. It has a much broader field of application. For drawing dies in general, and especially for those used in drawing wire, it has met with tremendous success. On the basis of production, it has approximately the same life as a diamond die, but more recutting for larger sizes is possible with the carbide. The overall improvement in cost

on a general performance basis over the diamond is about 6 to 1. In comparison with chilled iron dies, the results are even more outstanding, as in one particular case a single carbide die produced 20 per cent more steel wire than was produced on 264 chilled iron dies.

In conclusion, we feel that we should again emphasize the fact that the creation of cemented tungsten carbide marks the beginning of a new era in metallurgy and shop practice.

The new high-production steels, like the super-high-speed steel, the high carbon-chrome-molybdenum-vanadium steel and the new tungsten carbide material, are all bringing about great economies in production costs. This will ultimately result in making the necessities of life, and luxuries as well, cheaper, thus raising the standard of living and promoting all kinds of improvements.

## Steel Founders to Meet in St. Louis March 27

The March meeting of the Steel Founders' Society of America, Inc., will be held at the Statler Hotel, St. Louis, Thursday, March 27. In addition to routine business and reports, three talks will be given at the morning session. W. J. Corbett, chairman, Fort Pitt Steel Casting Co., McKeesport, Pa., will speak on "Cost." Industrial and technical research will be discussed by Harold S. Falk, chairman, Falk Corporation, Milwaukee, and R. J. Doty, chairman, Reading Steel Castings Co., Reading, Pa. Hibbard S. Greene, Chain Belt Co., Milwaukee, will address the small castings group on "Merchandising."

# Dullness Persists in European Markets

Shipbuilding in Britain a Bright Exception—Tin Plate Moderately in Demand—Doubt American Adhesion to Cartel

(By Cable)

LONDON, ENGLAND, March 17.

THE pig iron market is extremely dull, with consumers not yet considering spring requirements and pressing for lower prices on current purchases. Cleveland makers, however, are granting no concessions, although fuel and ore costs have again decreased. Stocks of iron are estimated to be heavy and suspension of certain blast furnaces is probable. Hematite stocks at furnaces and on merchants' yards are large, resulting in easier prices.

Finished steel demand is light. Steel makers are meeting this week to discuss the situation. Export demand for heavy steel is negligible, but domestic demand is likely to be improved by recent new shipbuilding contracts.

The Continental market here is quiet, with consumers refraining from purchasing and merchants still uncertain as to their position under the new terms announced by the International Steel Cartel. The cartel has reaffirmed the tonnage quota for second quarter and has been renewed until October.

Tin plate is quiet generally, consumers being influenced by the irregular tin market. Makers' order books, however, are well filled and many mills are actively employed. Japan has bought 50,000 boxes of oil can size tin plate for May-June-July shipment at full prices.

Galvanized sheet inquiry, especially

from India, is improving, suggesting that some substantial orders are in prospect. Mills are in need of orders, but prices are maintained at a fixed minimum. Black sheets are quiet.

Registration has been announced of the Lancashire Steel Corporation, with a nominal capital of £100. This is believed to be the merger comprising Pearson & Knowles Coal & Iron Co., the Partington Steel & Iron Co., and Rylands Brothers, Ltd.

The Cunard Line is reported negotiating for the construction of a large Atlantic liner. The Anglo-Saxon Petroleum Co. has placed orders for 20 11,500-ton motor tank ships, of which 8 are to be built here and 12 in Continental shipyards. The Ford Motor Co. bought 190,000 tons of

Wabana ore for the Dagenham plant, delivery to be made from 1931 to 1933. Staveley Coal & Iron Co., Ltd., has secured an order for 11,000 tons of cast iron pipe for drainage work in Cairo, Egypt.

The Anglo-Persian Oil Co. has placed an order with the Greenock Dockyard Co. for a 10,000-ton motor tank ship. Vickers Armstrong have received a contract for a first-class passenger liner from the Furness, Withy Line, which will permit resumption of operations at the Walker Naval shipyard, following 18 months of idleness.

The Barrow Hematite Steel Co., Ltd., may be forced to suspend because of lack of rail orders.

## British Steel Trade Dull

Increased Costs Expected from Coal Mines Bill—Foreign Buyers Limiting Orders to Immediate Requirements

LONDON, ENGLAND, Feb. 28.—The British iron and steel industry is passing through a disturbing phase and the outlook is far from satisfactory. Faced with increased production costs under the pending Coal Mines bill, makers of pig iron and finished iron and steel products are disinclined to reduce prices, despite slightly lower fuel and ore costs than some months ago.

Depression has developed outside of

the iron and steel industry, and the general volume of business today is at a low ebb. Both in the domestic and export markets, consumers of pig iron are buying only to cover immediate needs.

When the Steel Export Association was formed, the mills expected an increasing volume of export business, but there is beginning to be some question as to its efficacy, as producers appear to be reaping but little

## British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp, with the £ at \$4.8665 (par)

### British Prices f.o.b. United Kingdom Ports

Cleveland No. 3 foundry	£3 7½s.	\$16.39
East Coast hematite..	3 17 to 3 17½	18.62 to 18.86
Ferromanganese, export	12 5 to 12 10	59.61 to 60.83
Billets, open-hearth....	6 2½ to 6 12½	29.81 to 32.24
Sheet bars, open-hearth	5 17½ to 6 5	28.59 to 30.42
Black sheets, Japanese specifications	12 5	59.61
Tin plate, per base box	0 18¼ to 0 18¾	4.43 to 4.55
Rails, 60 lb. and heavier	7 15 to 8 15	37.72 to 42.58
Steel bars, open-hearth	8 0 to 8 10	1.74 to 1.85
Beams, open-hearth....	7 7½ to 7 17½	1.60 to 1.71
Channels, open-hearth..	7 12½ to 8 12½	1.66 to 1.87
Angles, open-hearth....	7 7½ to 7 17½	1.60 to 1.71
Ship plates, open-hearth	7 15 to 8 5	1.68 to 1.79
Black sheets, No. 24 gage .....	9 15 to 10 0	2.12 to 2.17
Galvanized sheets, No. 24 gage.....	11 17½ to 12 5	2.57 to 2.60

Billets, Thomas.....	4 13	to 4 14	22.63 to 22.87
Sheet bars, Thomas....	4 13	to 4 15	22.63 to 23.12
Wire rods, low C., No. 5 B.W.G. ....	6 2	to 6 4	29.69 to 30.19
Rails, 60 lb. and heavier	6 8½	to 6 10*	31.27 to 31.63
Rails, light.....	6 0		29.20 Cents a Lb.
Steel bars, merchant...	5 7½		1.18
Steel bars, deformed...	5 6½	to 5 7½	1.17 to 1.18
Beams, Thomas, British standard .....	5 3	to 5 6	1.12 to 1.17
Channels, Thomas, American sections...	5 11	to 5 14	1.23 to 1.26
Angles, Thomas, 4-in. and larger, over % in. thick .....	5 6		1.17
Angles, Thomas, 3-in....	5 7½		1.18
Ship plates, open-hearth inspected .....	7 3	to 7 5	1.56 to 1.60
Black sheets, No. 31 gage, Japanese.....	12 1	to 12 3	2.66 to 2.68
Hoop and strip steel over 6-in. base.....	5 17½		1.28
Wire, plain, No. 8 gage	6 10	to 6 17½	1.42 to 1.50
Wire, galvanized, No. 8 gage .....	8 5	to 8 6	1.79 to 1.80
Wire, barbed, 4-pt. No. 12 B.W.G. ....	10 17½	to 11 0	2.36 to 2.38
Wire nails, base.....	6 15		\$1.47 a keg
Wire nails, assortments 1 to 6-in. keg.....	10 5		2.22

\*Open-hearth steel, 8s. (\$1.95) a ton extra.

### Continental Prices, f.o.b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 0.50 to 0.90 per cent phos.	£3 6s. to £3 10½s.	\$16.06 to \$17.15
Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos. ....	3 1 to 3 2	14.84 to 15.08

benefit. Some orders have been booked through the association, but the total tonnage, when allocated to the various members, has not been of much consequence.

When the Continental cartel advanced prices, British mills were of the opinion that competition would diminish, but so far not even the Continental steel producers have benefited, as buyers in all markets have restricted orders to immediate needs.

Clayton & Shuttleworth, Ltd., Lincoln, long established agricultural engineers with an international reputation, have begun liquidation, and the good will, machinery, spare parts and certain liabilities of the company have been purchased for £17,500 (\$85,155) by Marshall, Sons & Co., Gainsborough, also agricultural engineers of international reputation.

### Anglo-German Sheet Cartel Discussed

DÜSSELDORF, GERMANY, March 4.—An agreement between British and German makers of Japanese specification black sheets (Nos. 30 and 31 gage) to control prices and fix quotas would not be unexpected. Formation of such an association, it is believed, would be comparatively simple, as there are only two mills in Germany and three important British mills interested in this trade. The German producers are the Gelsenkirchen Bergwerks A. G., subsidiary of the Vereinigte Stahlwerke A. G., Düsseldorf, and the Eisen und Stahlwerk Hoesch A. G., Dortmund.

Preliminary negotiations are said to have developed the fact that no difficulty will be encountered in fixing prices, but that no agreement has yet been reached on quotas for export to Japan. In the past few years the German mills have considerably increased their exports of thin-gage sheets, and the British mills are understood to be unwilling to accept the 1929 shipments as a basis for agreement. Negotiations will be resumed in March and April at Düsseldorf and in London.

### French Railroads Buy Cars in Germany

BORDEAUX, FRANCE, Feb. 28.—Recently some important orders for railroad rolling stock, which were expected to go to French shops, have been awarded to German builders. A Cologne company is reported to have received a contract for 750 cars for French railroads. It is pointed out in support of these purchases abroad that French shops have so increased prices through ententes, syndicates and agreements as to leave themselves open to foreign competition.

The agreement that has existed for some years among French, Belgian and Luxembourg producers of phosphoric pig iron has been dissolved, following inability of the members to agree on a division of markets.

The improvement in iron and steel business looked for in February has not been realized and a large volume of orders are still being withheld in the expectation of more favorable prices. The fact that most recent purchases have been for prompt shipment suggests that stocks in the hands of consumers are by no means large.

### Heavier Barbed Wire Sold for Export

HAMBURG, GERMANY, March 1.—A recent development in the barbed wire export trade is the specification of heavier gages than formerly. An increasing quantity of Nos. 10, 10½, 11 and 11½ B. W. G. wire is being exported to customers in the Near East and South Africa. The current prices of German mills for this wire are £11 to £11 2s. 6d. a ton (2.43 to 2.46c. a lb.) for No. 12 B. W. G., with discounts of 15s. (\$3.65) a ton for No. 10 gage, 7s. 6d. (\$1.82) a ton for No. 11 gage and 5s. (\$1.22) a ton for No. 11½ gage.

### Krupp to Increase Output of Nirosta Castings

ESSEN, GERMANY, March 3.—The Friedrich Krupp A. G. is planning a considerable increase in its output of high chrome-nickel castings, which will be distributed through a subsidiary company. While Nirosta steel castings have been available for some years, the prices are understood to have been unattractive to buyers. With the increase in output, castings of all grades and sizes will be made and prices will be sharply reduced.

### German Export Price Rebates Discussed

BERLIN, GERMANY, Feb. 28.—Negotiations between the Ingot Steel Syndicate and "AVI," representing the steel consumers, on the question of price refunds on steel entering into products that are exported, have not yet been concluded. It is generally believed, however, that the syndicate will abandon its position that such refunds should be confined to steel used in manufactured articles directly exported by the manufacturer.

Consideration is also being given to the proposal that the refunds should be paid in cash instead of certificates for use only in payments on future purchases through the Ingot Steel Syndicate.

The consumers of steel anticipate increased competition in consequence of the expansion of international cartels and other agreements to maintain prices. This, it is claimed, will be followed by invasion of the manufacturing fields by the larger steel producers. While manufacturers using steel will be charged increased prices for their materials, there will not be a corresponding increase in the production costs of steel. When a steel

mill uses its product in its own machine or engineering shops, it will be able to undersell the outside producer paying higher prices for materials.

### Wire Rod Cartel Gains Three New Members

WASHINGTON, March 11.—Wire rod producers of Czechoslovakia, Austria and Hungary decided to join the International Wire Rod Cartel at a recent meeting in Berlin, according to a report to the Department of Commerce. These producers have for some time adhered to the prices fixed by the international association without actually having been members. Membership is post-dated to Jan. 1, 1930, and will continue until Sept. 30, 1931, when their own three-party cartel expires. The International Wire Rod Cartel will terminate Dec. 31, 1931.

### Steel Cartel Expansion Still Remote

BERLIN, GERMANY, Feb. 28.—While there is still considerable discussion of extending the membership and control of the International Steel Cartel, with special emphasis on alleged negotiations with the American steel industry, nothing definite has developed.

In view of the laws in the United States and the general detachment of the American producers from European markets, it is considered doubtful in many quarters whether any agreement could be reached, and a formal "arbeitgemeinschaft," or binding agreement for collaboration, is generally considered quite impossible. Possible American participation is also discounted by the fact that no progress has been made toward bringing Poland and Great Britain into the cartel. British membership is suggested as possible if an international coal syndicate is formed first.

### Metals for Architectural Decoration Abroad

HAMBURG, GERMANY, March 1.—Germany is using an increasing amount of metal for architectural decoration, but is still far behind the United States in this respect. A substantial use of aluminum alloy is planned for the new buildings of the German Dye Stuff Corporation at Frankfort and Berlin, but except for the Nirostahaus in Essen, which demonstrates possible uses of Nirosta steel, high chrome-nickel alloy has not been used much for decorative purposes on the exterior of buildings.

In northern Germany considerable copper is used, following the tradition of North German architecture. In Hamburg the Deutschlandhaus and two other buildings are partly decorated with copper on the roofs and walls, and other buildings have some copper on the exterior for decoration.

## Machinery Markets and News of the Works

### Improvement at Chicago

#### Farm Implement Manufacturers Buy Machine Tools— Demand Generally Unimproved

A DEFINITE improvement in the volume of machine tool buying developed the past week in the Chicago district, but in the country as a whole there has been no reversal of the downward trend which has been in evidence for some months.

Orders at Chicago came principally from farm machinery and implement manufacturers, whose operations have for some time been above the average of other industrial groups.

Some Cincinnati machine tool builders also report that last week's orders were better than those of the week before. However, tool building plants are still operating on curtailed schedules, some departments running only five days a week.

A striking feature of the present situation is the large volume of pending business built up during the past two or three months. Many large industrial corporations with ample cash resources have important machinery

replacement programs, but boards of directors or other executives have not yet given the word to go ahead, and no doubt are awaiting more favorable business developments before taking action.

February shipments of machine tools were heavier than those of January, despite the shorter month, but the trend of orders last month still pointed downward. However, the rate of recession is less pronounced than it was a few months ago. Shipments are in larger volume than orders, with a consequent cutting down of machine tool builders' backlogs.

Seventy per cent of the members of an important machinery group report that current orders range from normal to very good, while 30 per cent report business to be below normal. In this group 90 per cent of the members are operating at from 75 to 100 per cent of capacity, and 93 per cent say that prospects are promising.

not convinced that the time is ripe for action.

Anglo-Chilean Consolidated Nitrate Corporation, New York, is inquiring for 10 overhead cranes, ranging in capacities up to 100 tons, for export to Chile. Amtorg Trading Corporation, New York, is in the market for 10 locomotive and crawl-tread cranes for export to Russia.

Shell Eastern Petroleum Products, Inc., 122 East Forty-second Street, New York, an interest of Shell Petroleum Corporation, Shell Building, St. Louis, is planning oil refinery on property recently acquired at Sewaren, N. J., to cost about \$700,000 with equipment.

Rubel Ice Corporation, 937 Fulton Street, Brooklyn, has awarded a general contract to Perlman & Wortman, 116 Lexington Avenue, New York, for a two-story automobile service, repair and garage building at 521-31 West Twenty-first Street, New York, to cost about \$140,000 with equipment. H. J. Nurick, 44 Court Street, Brooklyn, is architect.

Department of Correction, Municipal Building, New York, has filed plans for new group of buildings on Rikers Island, including one and one-half story power

plant, 100 x 155 ft.; two one-story factories, 288 x 486 ft., and 53 x 291 ft. respectively; one-story automobile service, repair and garage building, 117 x 135 ft., and one-story mechanical laundry, 44 x 168 ft. Entire project, with other structures, will cost \$6,969,600 including equipment. Sloan & Robertson, 42 Lexington Avenue, are architects.

Kelvinator Sales Corporation, 1 West Forty-seventh Street, New York, operated by Kelvinator Corporation, Plymouth Street, Detroit, manufacturer of electric-operated refrigerating units and equipment, has leased a building to be erected at Fifty-first Avenue and Twenty-third Road, Long Island City, totaling about 50,000 sq. ft. floor space, for a new factory branch and distributing plant.

Erie Railroad Co., 50 Church Street, New York, is planning expansion at locomotive repair shops and yards at Akron, Ohio, including new engine house, to cost about \$300,000 with equipment.

Pilot Radio & Tube Co., Poughkeepsie, N. Y., is arranging for removal of local plant of Twin Coupler Co. to its Everett Mills property at Lawrence, Mass., where operations of a number of subsidiary organizations will be concentrated. Production will be increased at last noted location.

Standard Oil Co. of New York, 26 Broadway, is planning one-story automobile service, repair and garage building, 100 x 112 ft., at Brooklyn, for company motor trucks and cars, to cost about \$70,000 with equipment.

Ovens, power equipment, conveying and other machinery will be installed in four-story plant, 100 x 225 ft., to be erected by Gottfried Baking Co., Inc., 534 East Seventy-second Street, New York, at Fifty-first Street and Eleventh Avenue, to cost \$250,000, for which plans have been filed. C. B. Comstock, 122 East Forty-second Street, is architect and engineer.

Brasco Mfg. Co., 28-14 Forty-first Avenue, Long Island City, manufacturer of copper and bronze door fronts, etc., has leased first floor in building at 36-07 Thirty-third Street for expansion.

Swan-Finch Oil Corporation, 205 East Forty-second Street, New York, manufacturer of lubricating oils, greases, etc., has purchased part of former plant of Lister Agricultural Chemical Works, Newark, comprising two large and several small buildings, and will use for new storage and distributing plant.

Hanson-Van Winkle-Munning Co., Matawan, N. J., manufacturer of buffing and electroplating equipment and supplies, has purchased A. P. Munning & Co., Matawan, manufacturer of kindred equipment, and will consolidate. Van Winkle Todd will be president of consolidated company; Nelson Todd, secretary, and E. N. Boice, treasurer. Purchasing company operates a branch plant at 324 Chestnut Street, Newark.

Industrial Institute, Inc., 26 Court Street, Brooklyn, has awarded general contract to Interstate Building & Development Co., 250 West Fifty-seventh

### New York

NEW YORK, March 18.—The Amtorg Trading Corporation, New York, is placing large orders for machine tools for shipment to various new projects in Soviet Russia. Aside from this buying, there has been no marked increase in activity in the New York territory. Machine tool sellers are amazed at the large volume of inquiries considering the small number of orders, and explain this by saying that many companies which have improvement programs in contemplation are assembling all of the necessary information but are awaiting a general improvement in business before making appropriations for the necessary expenditures. A great deal of engineering work is being done by machine tool companies on various projects, some of which run well up toward \$100,000. Prospective purchasers are convinced of the advisability of making replacements for the cutting of production costs and have the money in their treasuries to spend, but boards of directors and managing executives are apparently

Street, New York, for initial units of plant on property recently acquired near Toms River, N. J., for Diesel engine and other industrial instruction, to cost about \$1,000,000 with equipment. Walter S. Schneider, 1757 Broadway, New York, is architect.

General Alloy Co., 188 New Jersey Railroad Avenue, Newark, has plans for two-story addition, to cost over \$35,000 with equipment. Paul B. West, 24 Commerce Street, is architect.

Bell Telephone Laboratories, Inc., 463 West Street, New York, has purchased 132 acres near Mendham, N. J., and plans early construction of radio receiving station for experimental service, with power house and other operating units, to cost over \$85,000 with equipment.

Seiden Metal Products Corporation, New York, formerly the Selco Tool & Die Co., has moved its factory and office to 65 Bleecker Street.

## The Crane Market

In the past week or more business in the overhead crane field has shown a slight upward turn with the larger industrial users buying and inquiring for equipment. Meanwhile, business among the smaller plants has been less active. Many sellers view the present situation as the beginning of improvement in business conditions. The foremost inquiry in the market consists of a list of 10 overhead cranes ranging from medium capacity to 100 tons, for the Anglo-Chilean Consolidated Nitrate Corporation, New York.

Recent overhead crane purchases have included four 10-ton and 15-ton cranes by the Gulf States Steel Co., New Orleans, La., two 5-ton and two 10-ton cranes by the Anaconda Copper Mining Co., 25 Broadway, New York, two 5-ton and two 10-ton cranes by the Chapman Valve Mfg. Co., Indian Orchard, Mass., and a 75-ton overhead crane by the Cerro de Pasco Copper Corporation, 44 Wall Street, New York. The Maine Central Power & Light Co., Augusta, Me., has closed on a 125-ton gantry crane for Binghamton, N. Y., with the Shepard Niles Crane & Hoist Corporation, and the J. C. Turner Lumber Co., Irvington, N. Y., on two 10-ton, 100-ft. cranes with the same builder. The Illinois Steel Co., has awarded two 40-ton one 25-ton and three 10-ton cranes for its Gary works to the Alliance Machine Co., and has placed three trolleys with the Milwaukee Electric Crane & Mfg. Corporation. The Standard Oil Co. of Indiana has bought a 30-ton powerhouse crane from the Whiting Corporation.

While the locomotive crane field is only moderately active at present, contractors are beginning to show more interest in purchasing equipment. The largest inquiry in the locomotive crane field for some months is a list of 10 steam-driven railroad type and gasoline-driven crawler cranes from the Amtorg Trading Corporation, New York.

contemplates a mining and development plant in that vicinity.

W. G. Jarrell Machine Co., 1100 South Mint Street, Charlotte, N. C., has awarded general contract to Blythe & Isenhour, Inc., Breyard Court, for two-story addition, 50 x 80 ft., to cost about \$30,000 with equipment.

Board of Trustees, Georgia Institute of Technology, Atlanta, has received a grant of \$300,000 from Daniel Guggenheim fund for promotion of aeronautics, to be used for establishment of aircraft engineering school and aeronautical center at institution.

## New England

BOSTON, March 17.—Machine tool business continues quiet. Prospective buyers are asking for prices and dates of delivery, but are no nearer making purchases than they were on March 1. There is a larger surplus of skilled help than noted in a long time. On March 15 the General Electric Co., Lynn, Mass., laid off between 200 and 300 employees who have been with the company less than a year, thus giving full time work to older employees.

M. E. Converse & Sons, Winchendon, Mass., have plans for a one-story addition, 20 x 75 ft.

Hartford Special Machinery Co., Hartford, Conn., has started work on a two-story extension, providing 34,000 sq. ft. additional floor space.

United Electric Light Co., Springfield, Mass., about April 1 will let contract for a substation, 80 x 150 ft., to cost \$300,000 with equipment.

Chapman Valve Mfg. Co., Indian Orchard, Mass., will take bids on two manufacturing units about April 1.

F. S. Webster Co., 340 Congress Street, Boston, manufacturer of typewriter supplies and equipment, has plans for a new factory unit at Cambridge, Mass., to cost over \$40,000 with equipment. Densmore, Le Clear & Robbins, 31 St. James Avenue, are architects.

Merrimac Chemical Co., South Everett, Mass., is planning to rebuild local plant destroyed by fire March 14, with loss reported over \$250,000 with equipment.

Hygienic Ice Corporation, 881 State Street, New Haven, Conn., has plans for one-story plant at West Haven, to cost about \$45,000 with equipment. Brutus Gundlach, 597 Fifth Avenue, New York, is architect and engineer.

General Radio Co., 30 State Street, Cambridge, Mass., manufacturer of radio equipment and supplies, has plans for a four-story and basement addition, 50 x 100 ft., with extension, 20 x 24 ft., to cost about \$100,000 with equipment. Lockwood Greene Engineers, Inc., 24 Federal Street, Boston, is architect and engineer.

Hartford Engineering & Mfg. Co., Hartford, Conn., recently organized to manufacture special machinery and parts, has taken over plant, formerly occupied by Automatic Refrigeration Co., for initial production. Frank L. Young, head of Young Mfg. Co., Hartford, will be manager of new organization. John Oakley is president and Earl W. Knight, secretary and treasurer.

Dry Ice Corporation, 136 Broadway, Cambridge, Mass., is carrying out expansion at local plant, including installation of two new manufacturing units, electrification of mechanical equipment and other work, to cost about \$250,000. Company is a subsidiary of Liquid Carbonic Co., 3100 South Kedzie Avenue, Chicago.

W. D. Cashin Co., 35 Hartford Street, Boston, manufacturer of boiler equipment, radiator traps, etc., has plans for a one-story addition and improvements in present plant, to cost about \$45,000 with equipment.

Welker-Hoops Mfg. Co., Middletown, Conn., manufacturer of automobile accessories and equipment, has taken over former local plant of Westinghouse Electric & Mfg. Co. and will remodel for new factory. A new plating department will be installed.

Scott-Witter Steel Corporation, 540 Flatbush Avenue, Hartford, Conn., has changed its name to Hartford Electric Steel Co.

## Buffalo

BUFFALO, March 17.—Buffalo Foundry & Machine Co., 1543 Fillmore Avenue, Buffalo, has plans nearing completion for one-story addition to machine shop, 100 x 137 ft., to cost about \$65,000 with equipment. Reidpath & Wilson, Gerrans Building, are architects.

Syracuse Cold Storage Co., Tracy Street, Syracuse, N. Y., is planning to rebuild part of cold storage and refrigerating plant A, recently destroyed by fire.

Olean Metal Cabinet Works, Inc., Olean, N. Y., will soon take bids on general con-

tract for one-story plant to cost about \$250,000 with equipment. A. W. E. Schoenberry, First National Bank Building, Olean, is architect; O. R. Johnson, Fenton Building, Jamestown, N. Y., is associate architect.

Upson Co., Stevens Street, Lockport, N. Y., manufacturer of Wallboard and paperboard products, has plans for a two-story addition, to cost about \$40,000 with equipment.

Autofloat Corporation, care of George C. Doherty, Chamber of Commerce, Chamber of Commerce Building, Buffalo, is considering establishment of local plant for production of collapsible air chambers for non-sinkable ships and kindred marine products.

Board of Village Trustees, Orchard Park, N. Y., is asking bids until March 24 for a 15,000-gal. capacity hemispherical bottom steel tank on 35-ft. steel tower for municipal waterworks, also for steel and other metal fencing for site for new filtration plant. Industrial Planning Corporation, Walbridge Building, Buffalo, is engineer.

Liberty Wire Works, Inc., Buffalo, care of Herbert L. Wechter, 179 Timon Street, recently organized, is planning operation of local plant to manufacture wire goods. Joseph H. Schmitz, 361 Pratt Street, is an incorporator of new company.

## Philadelphia

PHILADELPHIA, March 17.—C. A. Hauser & Son, 1326 North Nineteenth Street, Philadelphia, manufacturers of surgical instruments, have awarded general contract to Allan Construction Co., 1640 West Hunting Park Avenue, for one-story plant, to cost about \$30,000 with equipment.

Morris, Wheeler & Co., Inc., Thirtieth and Locust Streets, Philadelphia, iron and steel products, has awarded general contract to McCormick-Lenham Co., Fortieth and Chestnut Streets, for one-story steel fabricating plant, 240 x 420 ft., to cost about \$150,000 with equipment. Julian S. Simsohn, Broad Street and Locust Avenue, is architect.

Philadelphia Electric Co., Tenth and Chestnut Streets, Philadelphia, has purchased property at Morrisville, Pa., and plans new electrical distributing plant for Bucks County, including transmission line extensions, to cost about \$100,000.

L. Norris Hall, Inc., 940 North Front Street, Philadelphia, iron and steel products, wire goods, etc., has leased part of building at Locust and Twenty-fifth Streets, for branch storage and distributing plant.

Electric Storage Battery Co., Nineteenth Street and Allegheny Avenue, Philadelphia, has awarded general contract to William Steele & Sons Co., for one-story addition, to cost about \$25,000 with equipment.

Clarke Can Co., Philadelphia, has been organized with capital of \$350,000 to take over and expand company of same name, with local plant at Twelfth and Fitzwater Streets, manufacturer of tin cans and other metal containers. James A. Clarke is treasurer of new organization.

Autocar Co., Ardmore, Pa., manufacturer of motor trucks, has arranged for a preferred stock issue to total \$1,071,200, part of fund to be used for expansion and operations. Company is developing a new six-cylinder motor, known as Blue Streak, for installation in its trucks.

A committee has been appointed, headed by Charles F. Repp, Glassboro, N. J., by

Gloucester County Boards of Education, Woodbury, N. J., to develop plans for a central vocational school for county.

Department of Property and Supplies, State House, Harrisburg, Pa., will receive bids until April 9 for an electrical generating unit for State hospital at Wernersville; until April 16 for an electric generator, steam turbine unit, coal-handling equipment and inside cranes, window-operating devices, sewage pumping station and other equipment for State hospital at Danville.

Sinclair Refining Co., 3301 Walnut Street, Philadelphia, plans rebuilding of part of storage and distributing plant at Trainer, near Marcus Hook, Pa., recently destroyed by fire, with loss reported over \$300,000 including equipment. Headquarters are at 45 Nassau Street, New York.

Laurence N. Thomas and Harry S. Thiel, Wilmington, Del., formerly connected with Standard-Trump Brothers Machine Co., with local plant at Beech and Anchorage Streets, recently acquired by Scott & Williams, Inc., Laconia, N. H., manufacturer of knitting machinery, have organized Thomas-Thiel, Inc., to take over and operate chromium plating division of Standard-Trump organization. Production will be continued for present in part of Standard plant, and will later be removed to another location where operations will be increased, including a cadmium plating department, a new process to take place of regular zinc galvanizing.

Harrisburg Gas Co., Harrisburg, Pa., has approved an expansion program in plant and system to cost \$368,000, of which more than \$200,000 will be used for a new equipment service and repair building at Fifteenth and Paxton Streets, with meter, pipe and other mechanical departments.

## Pittsburgh

PITTSBURGH, March 17.—Business continues dull. March sales of local dealers are generally behind the corresponding February period and new inquiry is not as free as earlier in the year. The failure of the steel and allied industries to undergo the usual acceleration in demand, which characterizes February and March, has accentuated the caution in buying equipment which has been exercised to a greater or less degree since last October. The railroads, which had been expected to partially make up for a possible decline in industrial buying, have done little and prospects are no better. The Pennsylvania is buying a few tools, but most of them are for its Eastern shops.

An optimistic note is sounded by the Allegheny Regional Advisory Board covering railroad car needs for the second quarter. Its report indicates an increase of 14.6 per cent in the car requirements of machinery builders in the second quarter, compared with the corresponding quarter of 1929. This increase is probably attributable to builders of rolling mill machinery and equipment who have heavy backlog. A local company is reported to have taken the contract this week for the new sheet mill of the Worth Steel Co., Claymont, Del. The Tarentum Steel Corporation, Tarentum, Pa., organized last year to manufacture wide sheets, expects to begin the construction of its plant late in April and complete the project in about six months.

American Tubular Elevator Co., 4700 Second Avenue, Pittsburgh, has awarded

general contract to Uhl Construction Co., 115 Fifth Avenue, Homestead, for one-story plant, 70 x 180 ft., at Neville Island, to cost about \$65,000 w'th equipment.

G. D. Patterson, 38 South Dearborn Street, Chicago, and associates have organized Standard Steel Car Corporation, with capital of \$1,000,000, to take over and operate Standard Steel Car Co., Frick Building, Pittsburgh; Mr. Patterson is treasurer of new organization. Carroll C. Robertson, 1724 Oliver Building, Pittsburgh, is an incorporator. Same interests have formed a subsidiary, Steel Car Forge Co., capitalized at \$100,000, to take over and expand company of same name, with headquarters in Frick Building.

Titusville Iron Works, Inc., Titusville, Pa., plans call for bids early in April for one and two-story addition, to cost over \$165,000 with equipment.

Electric Welding Machine Co., Wheeling, W. Va., has acquired welding and machine repair departments of Wheeling Machine Products Co., with local plant, and will consolidate. Expansion in output is planned.

Hookless Fastener Co., East Arch Street, Meadville, Pa., has plans for three-story and basement addition, 50 x 70 ft., to cost over \$70,000 with equipment. Wilbur Watson & Associates, 4614 Prospect Avenue, Cleveland, are architects and engineers.

Sinclair Refining Co., Nassau Street, New York, contemplates extensions and improvements in oil storage and distributing plant at Clarksburg, W. Va., including installation of additional equipment. Company is also considering additional such plants in West Virginia.

Wolverine Empire Refining Co., Reno, near Franklin, Pa., has awarded contract to M. P. Brown Boiler Works, Franklin, Pa., for extensions and improvements in local plant, to include installation of still towers, filters and auxiliary equipment. L. O. Boquin Co., 11 East First Street, Oil City, Pa., has also received contract for part of work. Entire program will cost about \$100,000.

## Detroit

DETROIT, March 17.—White Star Refining Co., Trenton, Mich., has awarded general contract to Arthur G. McKee & Co., Cleveland, for addition to gasoline refinery, to cost close to \$500,000 with equipment.

City Council, Allegan, Mich., is planning call for bids early in April for municipal hydroelectric generating plant, including power dam, to cost over \$400,000. Ayres, Lewis, Morris & May, Cornwall Building, Ann Arbor, are architects and engineers.

Ford Motor Co., Dearborn, has selected site on waterfront near East Marginal Way, Seattle, for new assembling plant, to cost over \$2,000,000 with equipment.

Consolidated Paper Co., Monroe Mich., has awarded general contract to W. H. Knapp Construction Co., Monroe, for addition for storage and distribution, to cost about \$150,000, to replace unit recently destroyed by fire. Wernert & Taylor, Nicholas Building, Toledo, Ohio, are architects and engineers.

Hub Steel Works, Inc., 9201 Central Avenue, Detroit, is planning addition for fabricating operations, to double present output, to cost over \$70,000 with equipment.

Board of Education, Hamtramck, plans installation of manual training department in new two and three-story junior high school to cost \$750,000, for which bids will be asked on general contract in April.

B. C. Wetzel & Co., Dime Bank Building, Detroit, is architect.

Swedish Crucible Steel Co., Butler Street and Grand Trunk Railroad, Detroit, has plans for a one-story factory branch and distributing plant at Windsor, Ont., to cost about \$80,000 with equipment. Henry M. Freier, Murphy Building, is architect.

Following recent merger of Ex-Cell-O Tool & Mfg. Co., 1200 Oakman Street, Detroit, manufacturer of aircraft equipment, tools, etc., and Airparts & Tool Corporation, 642 Catherine Street, manufacturer of kindred products, plans are under way to concentrate majority of production at plant of first noted company, increasing output in several divisions.

City Council, Portland, Mich., is considering extensions and improvements in municipal electric light and power plant, to cost about \$30,000 with equipment.

Borin Brothers, Inc., 635 Westminster Street, Detroit, has plans for one-story ice-manufacturing plant at Royal Oak, to cost \$80,000 with equipment. Westerlin & Campbell Co., 6022 Fourteenth Street, is engineer.

Detroit district offices of Cleveland Punch & Shear Works Co., Cleveland, have been moved to 4-259 General Motors building. R. S. Howell is in charge.

National Broach Co., Dayton, Ohio, has removed to Shoemaker and St. Jean Streets, Detroit, and has changed its name to National Broach & Machine Co.

## Cleveland

CLEVELAND, March 17.—Machine tool business continues moderately active. There has been little variation in the volume of sales during the past two or three weeks. A fair amount of business is in prospect, but many prospective purchasers are still hesitating. Sales, with few exceptions, are for machines that are needed in present operations. Virtually no business is coming from the automotive industry. The New York Central Railroad the past week purchased a 24 and a 20-in. lathe and two drilling machines through a Cleveland dealer. Palmer Match Co., Akron, bought a few machines, including a lathe, milling machine and a sensitive drill press.

Westinghouse Electric & Mfg. Co., 2209 Ashland Road, Cleveland, contemplates a two-story galvanizing unit to local works, to cost over \$60,000 with equipment.

Cleveland Railway Co., Hanna Building, Cleveland, has plans for one-story mechanical services and repair shop, to cost about \$50,000 with equipment. Wilbur Watson & Associates, 4614 Prospect Avenue, are architects and engineers.

Stockholders of Alliance Aircraft Corporation, Alliance, Ohio, are organizing the Warrior Aeronautical Corporation, to take over and operate local plant, which has been idle since last December. New company will arrange for financing and plans to resume production soon.

Thompson Products, Inc., 2196 Clarkwood Road, Cleveland, manufacturer of valves, pistons, etc., has plans for a one-story addition, to cost over \$80,000 with equipment. Unit is primarily for production of new line of engine valves.

Henry Gemke and Alexander J. Shenk, Delphos, Ohio, and associates have organized Haspel Corporation, with capital of \$75,000, to establish and operate local plant, including foundry and machine shop, for production of refrigerating machines, ice cream manufacturing equipment, etc.

Operations will begin soon. John Luma, Delphos, is also interested in new company.

United States Gypsum Co., 300 West Adams Street, Chicago, has acquired metal lath division of Youngstown Pressed Steel Co., Warren, Ohio, and will operate as unit of organization under name of Youngstown Pressed Steel Metal Lath Division.

Motch & Merryweather Machinery Co. has been appointed exclusive representative for Federal Press Co., Elkhart, Ind., in Cleveland, Cincinnati, and Pittsburgh territories. Complete stocks of Federal presses will be carried in the Motch & Merryweather warehouse in Cleveland.

Broadway Steel Co., 2912 East Thirty-fourth Street, Cleveland, has been consolidated with Builders Structural Steel Co., 2880 East Thirty-fourth Street, Cleveland, and new company will be known as Broadway Steel Division. Alfred Jackson, who headed management of Broadway Steel Co., will be in charge of new division.

H. V. Dockray Brass & Iron Co., Zanesville, Ohio, specializing in castings, has changed its name to Wise Foundry, Machine & Supply Co. There has been no change in management.

## Chicago

CHICAGO, March 17.—The past week has witnessed an improvement in machine tool demand. Formal orders have been entered against a large farm implement manufacturer's list, and this alone has been enough to turn the tide. Several small industrial lists also were closed. In addition, inquiries show a better tone. They are no more numerous than a week ago, but small buyers are less hesitant to ask for prices on more than one or two machine tools.

The Milwaukee road, which has a long list pending, has come into the market for a 7-ft. radial drill. There are reports of more active purchasing by Detroit automobile manufacturers. The American Bridge Co. is said to have placed a number of radial drills for shipment to its various fabricating plants.

Mulehide Roofing Co., West Forty-fourth Street and South Oakley Avenue, Chicago, manufacturer of roofing products, is contemplating one-story plant at Wilmington, Ill., 92 x 450 ft., to cost over \$80,000 with equipment.

Perfection Parlor Furniture Co., North Avenue and Girard Street, Chicago, has plans for three-story factory, to cost about \$75,000 with equipment. A. A. Tocha, 1200 North Ashland Avenue, is architect.

General Instrument Corporation, 549 West Randolph Street, Chicago, manufacturer of radio equipment, etc., has acquired plant and business of Carl A. Norrgren Co., Denver, manufacturer of automatic, hydraulic and pneumatic tool lubricators, couplings, etc., and will operate as unit at present location. Purchasing company has arranged for change of name to Commercial Instrument Corporation.

Montana-Dakota Power Co., Minneapolis, is planning construction of gas pipe line from Glendive to Williston, Mont., about 90 miles, to cost over \$1,000,000 with booster stations and equipment.

Ellerbe & Co., Endicott Building, St. Paul, architects, have plans for six-story automobile service, repair and garage building to cost \$450,000 with equipment.

Commonwealth Edison Co., 72 West

Adams Street, Chicago, has asked bids on general contract for a two-story service and operating building, to cost over \$750,000 with equipment. Holabird & Root, 333 North Michigan Avenue, are architects and engineers.

Mid-Continent Air Express and Pueblo & Western Air Express, Pueblo, Colo., care of Walter DeMordaunt, First National Bank Building, architect, have plans for joint hangar, with repair and reconditioning facilities, at local municipal airport, to cost \$80,000 with equipment.

Public Service Co. of Northern Illinois, 72 West Adams Street, Chicago, will soon begin superstructure for addition to steam-operated electric generating plant at Waukegan, Ill., to cost over \$700,000 with machinery; extensions will be made in transmission lines.

Board of Education, Sioux Falls, S. D., plans installation of manual training equipment in new three-story and basement high school to cost \$500,000, for which plans are being completed by Perkins & McWayne, Paulton Building, architects.

Offices and factory of the Ganschow division of Gears & forgings, Inc., Chicago, have been moved to 2108 North Natchez Avenue. Chicago district sales offices, under C. F. Goedke, will be located in new building of Ganschow division.

## Milwaukee

MILWAUKEE, March 17.—A moderate volume of machine tool business is passing, but production is supported principally by specifications for delivery on old bookings. The most encouraging feature is the continued expansion of inquiry. Replacement needs are the sustaining factor in current business.

Wisconsin Power & Light Co., Madison, Wis., subsidiary of Midwest Utilities Co., Chicago, has plans for steam generating plant on shore of Lake Michigan at Sheboygan, Wis., first unit to have 30,000-kw. capacity and cost \$6,000,000. Ultimate investment of \$25,000,000 is contemplated. Initial work will start April 1. L. E. Myers Construction Co., Chicago, is general contractor. L. P. Fessenden is district manager at Sheboygan.

Milwaukee Die Casting Co., 291-299 Fourth Street, Milwaukee, has plans for new shop group on new site, 380 x 470 ft., recently acquired on Holton Street. First unit will provide 45,000 sq. ft., compared with 20,000 sq. ft. in present plant. Work probably will begin about July 1.

Little Wolf Power Co., New London, Wis., has received permit to proceed with construction of hydroelectric generating plant on Little Wolf River, to contain three 450-hp. water wheel generators. Plans call for 22-ft. concrete dam and power house, 25 x 60 ft. L. E. DeGuere, Wisconsin Rapids, Wis., is consulting engineer.

International Harvester Co., 784 Park Street, contemplates erection of an addition to tractor and cream separator plant at Milwaukee, and is considering plans. Work is under way on remodeling and enlargement of a present shop unit, 68 x 200 ft., at cost of \$35,000. C. P. Rasmussen is chief engineer.

Lullabye Furniture Co., Stevens Point, Wis., manufacturer of children's furniture and hardwood products, will replace its sawmill, damaged by fire recently, by erecting new building, 40 x 120 ft. New equipment and motors are being purchased.

A. O. Smith Corporation, Twenty-seventh Street and Keefe Avenue, Milwaukee, has

engaged Holabird & Root, architects, Chicago, to design new eight-story administration building and research laboratories, 140 x 160 ft. It is planned to start work early in May. E. W. Burgess is chief plant layout engineer.

## Indiana

INDIANAPOLIS, March 17.—Gordon Body Co., 306 North Talbot Street, Indianapolis, manufacturer of automobile bodies, has asked bids on general contract for a one-story plant to cost about \$30,000 with equipment. W. A. Lyons is manager of construction, in charge.

Board of School Trustees, Lebanon, has been authorized to arrange a bond issue of \$89,000 for a vocational training school, for which plans will soon be drawn.

Holland Furnace Co., 604 Massachusetts Avenue, Indianapolis, with main plant at Holland, Mich., is removing its local factory branch and distributing plant to a three-story building at 740 East North Street, where increased operations will be carried out.

Ames Shovel & Tool Co., Anderson, has authorized plans for new plant to replace works recently destroyed by fire.

Board of Trustees, Indiana State Normal School, 620 North Calvert Avenue, Muncie, is considering construction of one-story power plant to cost \$50,000 with equipment.

George J. Mayer Co., 36 South Meridian Street, Indianapolis, manufacturer of stencils, embossed plates, cast bronze tablets, etc., has awarded general contract to Elmer J. Cubertson, 4216 College Avenue, for one-story addition, to cost about \$22,000 with equipment.

Board of Works, Indianapolis, has authorized erection of combination hangar and administration building at Ben Davis municipal airport, including repair and reconditioning facilities, to cost \$137,000 with equipment. Other hangar units are planned. Paul H. Moore is superintendent at airport.

Board of Trustees, Notre Dame University, South Bend, has plans for new engineering building, to cost about \$70,000 with equipment.

## St. Louis

ST. LOUIS, March 17.—W. N. Brown, 5100 Farlin Avenue, St. Louis, structural steel, is planning a two-story plant, 130 x 210 ft., with fabricating shop, to cost about \$70,000 with equipment.

Board of Education, 911 Locust Street, St. Louis, has plans for central power plant for school service, to cost about \$150,000 with equipment. G. W. Sanger, address noted, is architect for board.

George Gano, Hutchinson, Kan., has awarded general contract to J. T. McDowell Construction Co., Denver, for new grain elevator, with head house 200 ft. high, including elevating, screening, conveying and other equipment, to cost about \$200,000.

Laclede Gas Light Co., 1017 Olive Street, St. Louis, has arranged for a bond issue of \$5,500,000, part of fund to be used for expansion and improvements.

Fairfax Airport, Inc., Security Building, Kansas City, Mo., a subsidiary of Woods Brothers, Inc., same address, manufacturer of aircraft, has plans for new terminal building, with repair and reconditioning facilities, at Rosecrans Field, St. Joseph, Mo., to cost about \$60,000.

Walter Beschen, Tootle-Lacey Building, St. Joseph, is architect.

Skelly Oil Co., Eldorado, Kan., plans rebuilding part of local oil refinery, recently damaged by fire.

Baldor Electric Co., 5343 Duncan Avenue, St. Louis, is planning one-story shop, 70 x 100 ft., to cost about \$23,000 with equipment.

Dart Motor Truck Co., Twenty-seventh and Oak Streets, Kansas City, Mo., has leased building to be erected on adjoining site, two stories and basement, 40 x 75 ft., for which general contract has been let to Lawrence C. Gray, Pioneer Trust Building, and will occupy for expansion.

Carter-Waters Co., 2049 Main Street, Kansas City, Mo., road-building materials and supplies, has awarded general contract to E. L. Winn, Railway Exchange Building, for four-story storage and distributing plant, to cost \$150,000 with equipment. Archer & Gloyd, Pioneer Trust Building, are architects.

Central West Public Service Co., Omaha, Neb., is disposing of a bond issue to total \$1,050,000, part of proceeds to be used for extensions and improvements.

Big Four Foundry Co., 301 North Hartford Street, Tulsa, Okla., has plans for one-story addition, 30 x 100 ft., to cost about \$25,000 with equipment. Clarence Jeffries is general superintendent.

Cessna Aircraft Co., Wichita, Kan., manufacturer of airplanes and parts, is arranging for reorganization, including increase in capital from \$500,000 to \$1,000,000, part of proceeds to be used for expansion.

Missouri-Kansas-Texas Lines, St. Louis, is in the market for a 20-in. x 10-ft. motor-driven geared head engine lathe, with taper attachment and 18-in. steel body four-jaw independent chuck, complete with motor and magnetic switch for 440-volt, 3-phase, 60-cycle circuit, for shops at Sedalia, Mo.

City Council, Campbell, Mo., plans early call for bids for extensions and improvements in municipal electric light and power plant, to cost \$75,000 with equipment. Russell & Axon, 6200 Easton Avenue, St. Louis, are engineers.

Barnsdall Corporation, Okmulgee, Okla., is planning construction of a welded steel pipe line from Okmulgee to Milwaukee, by way of Kansas City, Mo., and Des Moines, Iowa, about 800 miles, for gasoline transmission, to cost about \$10,000,000 with booster stations, etc. Company will organize Barnsdall Transportation Co., a subsidiary, to carry out project.

## Cincinnati

CINCINNATI, March 17.—Although demand for machine tools in this district is still below the rate of the second half of last year, the first two weeks of March have brought an improvement in the volume of new business. This is particularly true with lathes and drills, although manufacturers of planers and other heavy tools also note a gain. New bookings the past week were slightly more than those in the preceding week. However, district plants are still operating on curtailed schedules with some departments on a five-day week.

An agricultural equipment manufacturer has purchased four lathes from a local builder and an unnamed fabricator placed

an order for six radial drills. Two other companies purchased one drill each.

Crucible Steel Co. of America, Inc., 209 West Third Street, Cincinnati, headquarters at Pittsburgh, has awarded general contract to Ferro Concrete Construction Co., Third and Elm Streets, for one and two-story storage and distributing plant, to cost about \$80,000 with equipment.

Val J. Decker Packing Co., Piqua, Ohio, meat packer, has plans for an addition, including conveying and cold storage equipment, etc., to cost about \$200,000. Andrews & Riner, Erie Building, Cleveland, are architects and engineers.

Simplicity System Co., Volunteer Life Building, Chattanooga, Tenn., manufacturer of construction equipment, affiliated with West Construction Co., same address, has plans for new plant on Riverside Drive, where 18 acres has been secured, to cost about \$80,000 with equipment. Larry B. West is head of both organizations.

Chesapeake & Ohio Railway Co., Richmond, Va., is arranging immediate erection of superstructure for new sandblast and reclamation shops at locomotive repair plant at Russell, Ky., for which general contract recently was let to Hughes-Foulkrod Co., Pittsburgh, to cost over \$80,000 with equipment. Expansion program will also be carried out at local classification yards.

Hilary J. Berning, 1124 West Eighth Street, Cincinnati, local representative for Ford automobiles, has asked bids on general contract for three-story and basement service, repair and sales building, 100 x 200 ft., to cost about \$200,000 with equipment. John J. Brown, Provident Life Building, is architect.

Tri-State Armature & Electrical Works, 327 East Butler Street, Memphis, Tenn., is planning one-story addition, to cost about \$23,000 including equipment.

## Gulf States

BIRMINGHAM, March 17.—Canouette Shipbuilding Co., Slidell, La., is planning one-story machine and repair shop, 40 x 200 ft., to cost about \$40,000 with equipment.

Alabama School of Trades, Birmingham, Wyatt T. Brown, chairman, is planning erection of three one-story shop units at school at Gadsden, Ala., 60 x 150 ft., to cost about \$55,000 with equipment.

Humble Pipe Line Co., Houston, Tex., operated by Humble Oil & Refining Co., Houston, has authorized immediate construction of 8-in. pipe line from Refugio, Tex., to company refinery at Ingleside, to cost over \$300,000 with pressure stations and equipment.

International Harvester Co., 606 South Michigan Avenue, Chicago, has awarded general contract to Kucharo Construction Co., 1342 South Flores Street, San Antonio, Tex., for two-story factory branch and distributing plant, 100 x 300 ft., and 100 x 183 ft., respectively, at Sweetwater, Tex., including assembling division, to cost \$125,000 with equipment.

Scobey Fireproof Storage Co., 311 North Medina Street, San Antonio, Tex., is planning call for bids early in April for a four-story and basement cold storage and refrigerating plant, 100 x 165 ft., to cost over \$200,000 with machinery. Engineering Service Corporation, Post Dispatch Building, Houston, Tex., is engineer.

International Derrick & Equipment Co., Columbus, Ohio, has awarded general contract to King-Huff Construction Co.,

Beaumont, Tex., for one-story addition to factory branch and distributing plant at Beaumont, 100 x 250 ft., to cost about \$70,000 with equipment.

Pure Oil Co., Houston, Tex., has authorized construction of pipe line from its properties in Van, Tex., to oil refinery at Smiths Bluff, Tex., about 200 miles, to cost over \$650,000 with pressure stations, etc. Headquarters are at Chicago.

Collins Conrad, Breaux Bridge, La., and associates are planning new brick manufacturing plant near New Iberia, La., to cost about \$70,000 including kilns, conveying and other mechanical-handling equipment. Company will be formed to carry out project.

Claude Neon Federal Co., 225 North Michigan Avenue, Chicago, manufacturer of electric tube signs and displays, contemplates a new branch plant at Dallas, Tex., to cost about \$35,000 with equipment.

Board of Education, Dallas, Tex., C. M. Moore, business manager, is asking bids on general contract until March 25, for first wing of new technical high school, to cost over \$300,000 with equipment. Other units will be built later. Herbert M. Greene, LaRoche & Dahl, Construction Building, are architects.

St. Louis Smelting & Refining Co., International Life Building, St. Louis, has taken options on properties of American Zinc Co. and High Five Mining Co., totaling about 175 acres near Waco, Tex., and contemplates construction of a central mill, in conjunction with existing plant of last noted companies, to handle tonnage from different properties, to cost over \$150,000 with machinery.

Western Metal Mfg. Co., 3300 Maury Street, Houston, Tex., has arranged for increase in capital from \$100,000 to \$200,000, part of fund to be used for expansion.

## Pacific Coast

SAN FRANCISCO, March 13.—Colloidal Graphite Co., 812 Foreman Building, Los Angeles, is considering new three-story plant near city, totaling about 12,000 sq. ft. floor space, to cost about \$55,000 with equipment.

Board of Education, Long Beach, Cal., will build a vocational shop in connection with new high school group at North Long Beach, to cost \$325,000, for which plans are being drawn by Parker O. Wright, Jergins Trust Building, Long Beach, architect.

Consolidated Chemical Industries, Inc., Financial Center Building, San Francisco, has awarded general contract to Austin Co. of California, Inc., Russ Building, for addition to plant at South San Francisco, to cost about \$300,000 with equipment.

Angelus Sanitary Can Co., 4900 Pacific Boulevard, Vernon, Los Angeles, has awarded general contract to Austin Co. of California, Inc., for one-story plant unit, to cost about \$23,000 with equipment.

National Ice & Cold Storage Co., Postal Telegraph Building, San Francisco, has plans for a one-story addition to ice-manufacturing and cold storage plant at Santa Rosa, Cal., to cost about \$80,000 with machinery. W. C. Phillips, address noted, is engineer.

Grinnell Co., Inc., Providence, R. I., manufacturer of fire extinguishers, fire sprinkler systems, etc., has asked bids on general contract for a one-story factory branch and distributing plant at Seattle, 134 x 300 ft., to cost about \$200,000 with

## The Week's News Quickly Told

### Current Events That Bear on the Course of Business

COMMODITY prices dropped last week in America, Britain and Italy to the lowest of the year.

EMPLOYMENT showed gains throughout the country. Factory payrolls indicated gains of 3 per cent. Spring building activity is expected to improve the situation further . . . Every person in the United States who is out of work when Federal Census takers begin their work in two weeks will be asked ten questions in addition to the regular list to establish basic facts about employment.

BUILDING contracts for the first six days of March show a little gain over the average for the earlier part of February, according to the findings of the F. W. Dodge Corporation. The daily average of \$12.2 millions is about \$2.8 millions below that of the corresponding period last year.

FEDERAL income tax returns tabulated thus far indicates that returns will be little lower than for last year. It was expected that losses in the stock market and the 1 per cent reduction in normal tax, authorized shortly after the market break, would cut over \$100,000,000 from the revenue. Exceptionally large corporation earnings during the first three quarters of the year are credited with preventing the anticipated decline. Corporation earnings for 1929 so far analyzed by the Treasury show gains of 10 per cent over 1928.

MERCHANDISE exports in February were \$351 millions against

\$441.7 millions in February, 1929, and imports were \$281 millions against \$369 millions a year ago. In eight months of the fiscal year exports have exceeded imports by \$675 millions, while a year ago the excess was \$936 millions. The decline in exports amounts to \$300 millions, for that in imports was only \$39 millions—in comparing the two periods.

OVER \$100,000,000 worth of telephone equipment will be used in the United States during the year for the extension of long distance facilities alone, and for telegraphic lines between distant cities, to relieve congestion due largely to the widespread use of telephonic communication by business houses.

CRUDE oil prices advanced last week in ten fields from \$1.464 to \$1.489 a barrel . . . Production in California and Oklahoma fields has been curtailed to within 3 per cent of the daily rate set by the Federal Oil Conservation Board and trade associations as profitable . . . American Petroleum Institute predicts a 22 per cent increase in gasoline consumption in 1930.

AN American Government representative will be sent to Paris to attempt to dissuade the French from imposing an additional extraterritorial tax on American owned French subsidiary corporations. The tax now proposed, with the present "double taxation" measures that have been the subject of appeal to the French courts by a Boston firm would amount, it is said, to about 51 per cent of profits.

## Canada

TORONTO, March 17.—Armstrong-Sidley Co., Coventry, England, contemplates erection of a plant at Britannia, Ont., to build airplanes. Ottawa Car Mfg. Co., 301 Slater Street, Ottawa, Ont., is Canadian representative.

Canadian Pacific Railway Co., head office, Montreal, contemplates building addition to engine house at Fort William, Ont., and an addition to Weston shops at Winnipeg. J. C. Holden, Winnipeg, is district engineer.

Work will start soon on erection of an addition for Canadian Oil Co., London Junction, Petrolia, Ont., to cost \$500,000.

Several contracts have been awarded for a plant at Burford, Ont., to cost \$225,000, for Canadian Aggregates, Ltd., Harbor Commission Building, Toronto.

W. Pretty, 1688 Ferry Street, Niagara Falls, Ont., has awarded contract to Noble Benson, 832 Third Street, for a garage and workshop to cost \$50,000. Equipment will be purchased.

Water Commission, St. Thomas, Ont., is planning to purchase additional filtration machinery and 2000 water meters, to cost \$32,000. W. C. Miller is engineer.

Bids will be called at once for a two and one-half story paper mill at Vancouver, B. C., for Pacific Mills, Ltd., Ocean Falls and Vancouver. W. G. Swan, Birks Building, Vancouver, is engineer.

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## Contents for MARCH 27, 1930

Teaching Heat Treating . . . . .	915
How the University of Illinois Covers This Subject	
Light Metals in Automotive Field . . . . .	918
New Alloy with Low Expansion Factor Used in Motor Car Design	
Large Members Machined Accurately . . . . .	921
Baldwin Locomotive Works Feeds Parts for Engines into Erecting Forms	
Practice in Making Duplex Steel . . . . .	925
Methods of Control of Slag and of Oxidation and Elimination of Phosphorus	
Making Refrigerators on Conveyors . . . . .	928
Several Types of Equipment Used in Assembling and Inter-Department Hauls	
Automotive Materials Symposium . . . . .	930
Latest Developments Reviewed at Testing Society Meeting in Detroit	
Critical Temperature in Galvanizing . . . . .	933
Several Important Changes Occur at About 950 Deg. Fahr.	
Why Not Profits in Foundries? . . . . .	936
Improved Facilities, Adherence to Specifications and Uniform Accounting May Help	
Advance Research in Metals . . . . .	938
Committees of American Society for Testing Materials Make Progress	
Business at Bottom of Valley . . . . .	941
Dr. Haney Believes Stabilization Is Not Far Off, But Valley May Be Wide	

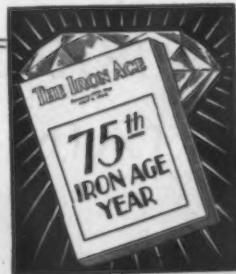
Paint Coatings and Riveted Joints . . . . .	917
Metals to Resist Pickling Solution . . . . .	917
Best Conditions for Pouring Ingots . . . . .	920
Season Cracking of Brass . . . . .	932
Mechanical Lapping Rapid . . . . .	943

\* \* \*

This Week's IRON AGE in Brief . . . . .	942
New Equipment . . . . .	944
EDITORIALS . . . . .	950
Correspondence . . . . .	952
The Week in Business . . . . .	953
Iron and Steel Markets . . . . .	954
Non-ferrous Metal Markets . . . . .	971
Personal Notes . . . . .	973
Foreign Steel Markets . . . . .	975
Machinery Markets . . . . .	978
New Trade Publications . . . . .	983
The Week's News Quickly Told . . . . .	984

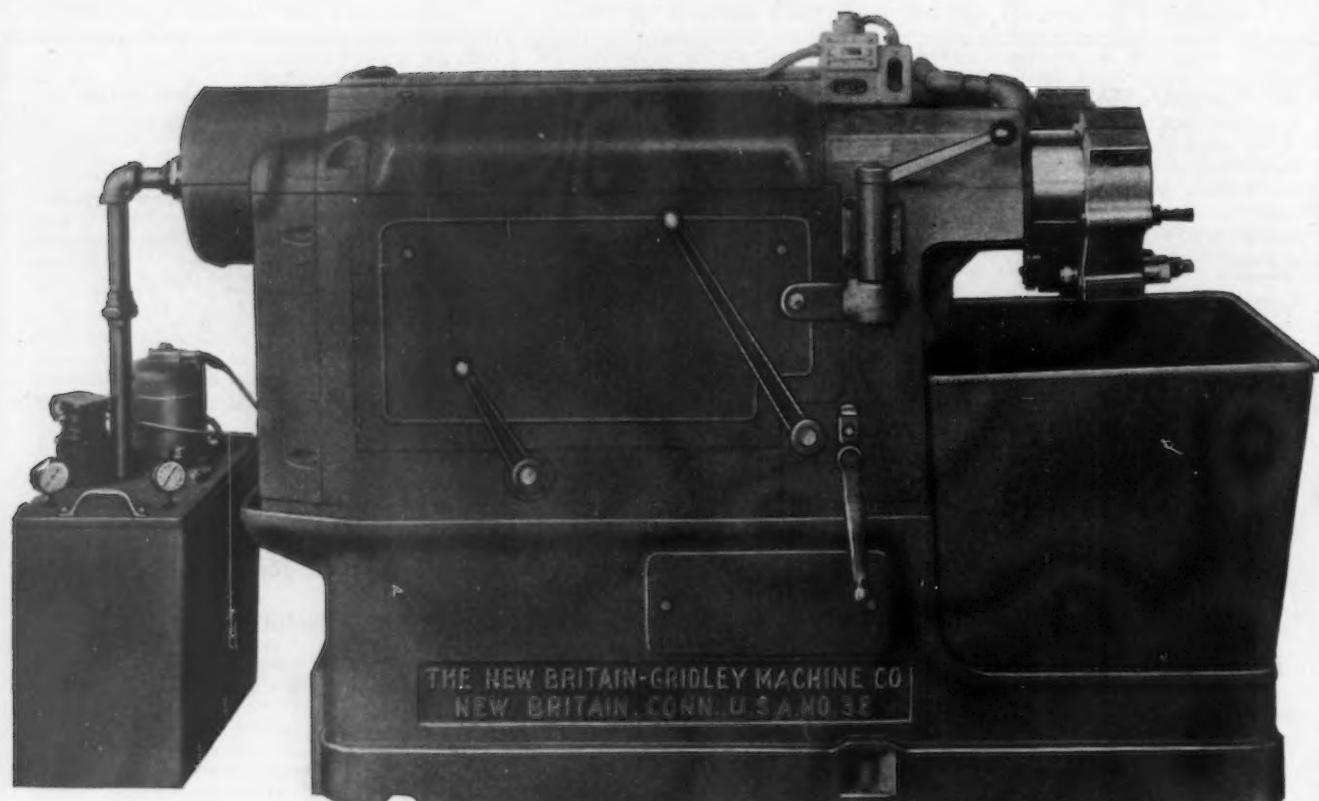
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